MIDDLE AND LATER BYZANTINE WALL PAINTING METHODS

A COMPARATIVE STUDY

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ABBREVIATIONS

Trebizond — The Church of Saint Sophia, Trebizond. Thirteenth century

Asinou — The Church of the Mother of God Phorviotissa, Asinou, Cyprus.
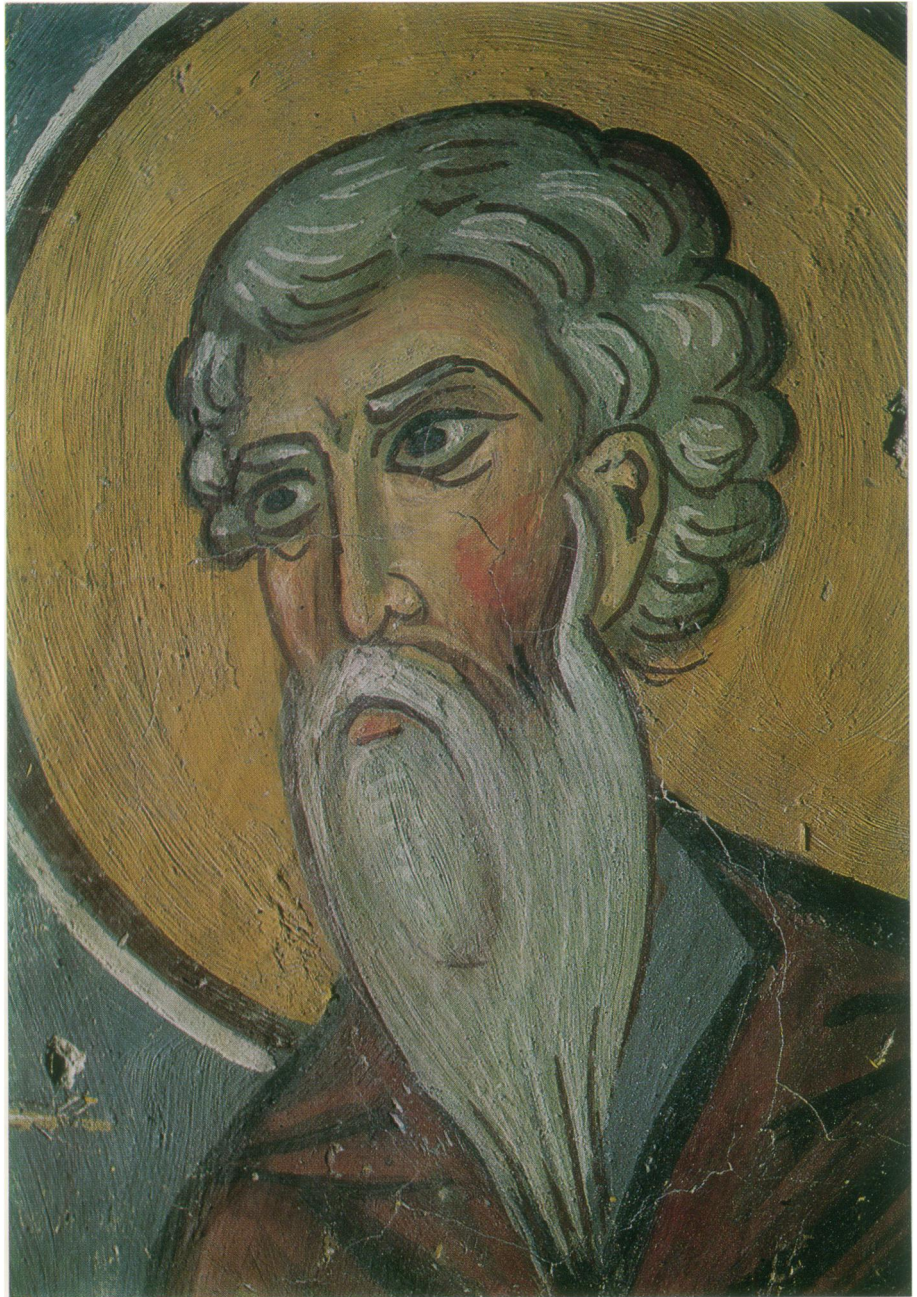
1. The Coloring of a Face, 1106 (see Fig. 24)

2. The Coloring of Clothing,
    a Three-tone System, 1333   A. Cyprus, Asinou

THE study of Byzantine wall paintings has been hampered since its inception by the relative inaccessiblity of many of the churches, by the absence of adequate lighting in most of them, by the accumulation of centuries of soot and grease over paint surfaces, and by the fact that only paintings at ground level can be studied in detail without the aid of scaffolding. It is just in recent years that less restricted travel and cleaning and conservation measures have facilitated more accurate appreciation of the paintings, and the present survey attempts a preliminary study of the methods by which Byzantine wall paintings were made.[1]

It can be no more than a preliminary survey at the moment, since the close study of wall paintings is a subject as yet in its infancy. A consideration of the related methods of making manuscript illuminations, icons, encaustic paintings, and mosaics will rarely be introduced for it would have widened the scope of this paper too greatly, and I shall hope to pursue these subjects on some future occasion.

The relevance of technical changes to developments in artistic style has long been accepted, and in the field of painting the most obvious example of this is the introduction, into general use, of oil as the medium for applying color to easel paintings. By comparing Byzantine methods with the practice of mediaeval painters in Western Europe and by reference to the manuals, it will be seen that in methods of wall painting there are technical changes similar in importance to the introduction of oil in easel painting, and that the great stylistic changes which began to appear in the latter half of the thirteenth century to herald the Italian Renaissance are linked with different methods of plastering and applying paint to walls. The first, but by no means the least acute of modern art historians, Giorgio Vasari, understood and explained the importance of technical change in forming the new style because he was himself a painter. This survey will, I hope, define more accurately what Vasari meant when he referred to the paintings of "those Greeks."

The order in which the subject will be dealt with is based more or less upon the order in which wall painters made their paintings. Each section begins with an examination of original texts relevant to the subject and is followed by a consideration of such evidence as can be gathered from wall paintings. Where it seemed useful I have supplemented the primary sources with a discussion of the opinions of modern authorities. In so far as the evidence presented derives from personal observation, it is of a factual nature, but I am aware of the great gaps in the account in both regional and temporal spheres. It is indeed because of these gaps that it seemed worth publishing the survey now in the hope of encouraging those who would write on particular churches containing paintings to

begin with a factual description of the materials and methods which they see employed. Archaeologists have long realized the importance of accurate factual description of what they find, and if wall paintings were described with as much care as are potsherds, for instance, the area of speculative writing about them might be usefully reduced.

THE PLASTER

CONTENT OF PLASTER, THICKNESS, AND NUMBER OF LAYERS

The plaster which forms the surface or ground for most wall paintings must be our starting point. The consideration of original literary sources on a subject precedes in each section a discussion of the evidence derived from the monuments. The facts about monuments have been put into tabular form, and as necessary background for the Byzantine period I have included a few examples which it is hoped may typify the plastering practices of the Ancient World.

The basic material for wall plaster throughout the Roman and mediaeval period is slaked lime, but in the manner in which it was mixed with other substances and in the spreading of it upon the wall considerable variations are to be found. The first comprehensive written account is given to us by Vitruvius.[2] He treats of the subject from the slaking of the lime through to the painting of the wall, and advocates at least six layers of plaster over the rough cast of lime and powdered pottery; the first three to be of lime and sand, and the last three of lime and marble dust in coats of diminishing thickness toward the surface layer. On curved ceilings there is, in addition, to be a basis of wooden lattice work and reed secured by iron nails to hold the plaster securely in place. He finishes with the warning: "But when only one coat of sand and one of sifted marble is applied, the thin stucco cannot resist damage and is easily broken, and it does not keep a finish of proper brilliance because of its inadequate thickness."

Pliny[3] also treats of lime and the slaking of it, pointing out that some limes are more unctuous than others. He recommends a mixture of one part lime to three parts quarry sand or one part lime to two parts sea or river sand, and instructs us that the mortar will be better if one-third part of it consists of crushed potsherds. He gives the interesting information that it was at one time illegal to use a mortar less than three years old, and he prescribes three coats of mortar and two coats of lime and marble dust as the proper number of layers for plastering a wall. Like Vitruvius he recommends an initial coating of rough cast plaster containing crushed potsherds, and mentions a temple at Elis where the plaster was worked with milk and saffron; perhaps an indication of the use of casein. Chapter fifty-eight is a receipt for a plaster called maltha, which "is prepared from freshly calcined lime, a lump of which is slaked in wine

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[2] *On Architecture*, ed. and trans. Frank S. Granger (Loeb) (London, 1934), 2, Bk. 7, chaps. 2–4, pp. 87–101, esp. pp. 90–95.

[3] *Natural History*, ed. and trans, D. E. Eichholz (Loeb) (London, 1962), 10, Bk. 36, chaps. 53–55, pp. 136–141.

and then pounded together with pork fat and figs, both of which are softening agents. Maltha is the most adhesive of substances and grows harder than stone. Anything that is treated with it is first thoroughly rubbed with olive oil."[4]

After Vitruvius and Pliny we have to wait for over half a millenium for the Lucca Manuscript. It is generally considered to be eighth century, but many of the receipts in it derive from the classical period, and Pliny's maltha becomes multa for which the following instructions are given: "You put in lime one part, sand four parts, crushed brick a third of a part, water one congium, pig's fat two parts; let the mixture rest one week, but the longer you leave it the better it will be. Keep pouring into it according to its needs, and let it be mixed. And then you use it in the work."[5]

A slight variant to the Lucca receipt is copied into the *Mappae Clavicula*, which exists in a number of manuscripts from the ninth to the twelfth centuries: "Multa ought to be prepared thus. You take one part lime, three or four parts sand, one-third part powdered earthenware, one-sixth part crushed straw, one congium water, two-sixths part hog's oil, and leave it for one week; if you leave it longer it will be better. Pay attention that it is mixed according to the measures indicated, for thus it must be prepared, and then to work with it."[6]

The ingredient "crushed straw" is almost certainly the chaff left after threshing a cereal crop. This is an ingredient of many Byzantine plasters; in fact I usually use it for making up plasters for conservation work since it is cheap, readily available, and a good binding material for lime plasters. Paragraphs 254 and 255 of the *Mappae Clavicula*[7] deal with the nature of lime and sand, and with the nature of brick for walls, and are only slight variations of what Pliny has to say on the subject.

Our next source, from the first half of the fourteenth century, is *The Craftsman's Handbook* of Cennino Cennini. Cennini's *Handbook* is a landmark in our written sources for wall painting in that it is the first comprehensive set of instructions on the subject that we possess. The contents still bear the mark of

[4] *Ibid.*, chap. 58, pp. 142–143.

[5] John M. Burnam, *A Classical Technology*, edited from *Codex Lucensis*, 490 (Boston, 1920), text, p. 15; trans., p. 81. I have emended his text in conformity with the same receipt in the *Mappae Clavicula*. Burnam, *ibid.*, p. 77, has stardust for the third ingredient, but the less romantic brick dust makes better sense and demands little modification of the text.

Ernst Berger, *Quellen und Technik der Fresko-, Oel- und Tempera-Malerei des Mittelalters*. Beiträge zur Entwicklungs-Geschichte der Maltechnik (Munich, 1897), pp. 9–21. For a study of the origins and date of the Lucca Manuscript and its relation to the *Mappae Clavicula*, see Rozelle Parker Johnson, *Compositiones Variae . . .*, Illinois Studies in Language and Literature, 23, no. 3 (Urbana, 1939).

In this and other translations from the Latin I have been greatly helped by the advice and guidance of Professor Bellinger. In translations from the Greek I owe thanks for his assistance to Professor Mango. However, the faults that may be found must be attributed to myself.

[6] Sir Thomas Phillipps, "Letter . . . communicating a transcript of a MS. Treatise on the preparation of Pigments, and on various processes of the Decorative Arts practised during the Middle Ages, . . . entitled Mappae Clavicula," *Archaeologia*, 32 (1847), XVIII, chap. 103, p. 209. For a commentary, see Rozelle Parker Johnson, "Notes on Some Manuscripts of the *Mappae Clavicula*," *Speculum*, 10 (1935), pp. 72–81, and for comparison and critical survey of the contents, E. Berger, *op. cit.*, pp. 22–29.

[7] Thos. Phillipps, *op. cit.*, p. 235; Fernand Mercier, *Les primitifs français. La peinture clunysienne en Bourgogne à l'époque romane, son histoire et sa technique* (Paris, 1931), p. 67, note 1. He gives a text and French translation of this receipt and has *étoupe*, meaning straw, as a translation for *testa*, which means brick, but I have been unable to find any justification for this; further, he has incorrectly transcribed and translated some of the quantities.

the earlier receipt books, but the important part of it is concerned with methods rather than materials. He recommends:

> ...first of all get some lime and some sand, each of them well sifted. And if the lime is very fat and fresh it calls for two parts sand, the third part lime. And wet them up well with water; and wet up enough to last you for two or three weeks. And let it stand for a day or so, until the heat goes out of it: for when it is so hot, the plaster which you put on cracks afterward. When you are ready to plaster, first sweep the wall well, and wet it down thoroughly, for you cannot get it too wet. And take your lime mortar, well worked over, a trowelful at a time; and plaster once or twice, to begin with, to get the plaster flat on the wall. Then, when you want to work, remember first to make this plaster quite uneven and fairly rough.[8]

When this base layer is dry, then the picture is drawn out upon it and afterward a second layer is applied—"So then, plaster a section with plaster, fairly thin, but not excessively, and quite even; first wetting down the old plaster." In three sections toward the end of his book, Cennini deals with the problem of waterproofing a damp wall in order to be able to paint upon it.[9] These sections have in common with Vitruvius' chapter on the same subject the use of powdered brick or tile for the plaster; Cennini's instructions may, in fact, be descended from Vitruvius, although they have changed in the transition. Cennini recommends initial coatings on the masonry of boiled oil, pitch, or liquid varnish, and then a rendering of powdered brick mixed with any one of these three. After this the rough cast and fine surface plaster are to be rendered as above.

There are two Italian terms for surface and base plasters which have come into increasing use in art historical literature in recent years. These must be explained here, but I shall then refrain from using them since one of them at least tends to confuse the subject. They are *arriccio* or *arricciato* which is the word for the base layer of plaster, and *intonaco* which is the word used for surface plaster. *Arriccio* presents no problem, but *intonaco* is a general term for plaster in Italy as well as a word for surface plaster, and the verb *intonacare* means to plaster or to prepare a smooth surface. Cennini uses *intonaco* for both the base plaster and the surface plaster at times, and he also uses the words *smalto* and *arricciato*. Examples are in chapter sixty-seven where he refers to *questo smalto bene arricciato* which in the next line he calls *intonacho esseccho*; later he writes: *Adunque smalta un pezo d'intonacho sottiletto, e non troppo, e ben piano; bangniando prima lo'ntonacho vecchio.*[10] In view of these complications it seems simpler to keep to the English terms "base plaster" and "surface plaster."

A Russian manual from the end of the sixteenth century gives a much more complicated receipt for a plaster, as follows:

> And as that plaster is nearly ready for the wall painting, tease some flax thoroughly, so that no pips remain, chop it finely and add to the plaster, which must be very thick. Also pound the bark of a fir tree finely with flour

[8] Cennini, *Il libro dell'arte*, ed. and trans. Daniel V. Thompson, Jr., *The Craftsman's Handbook*, 2 vols. (New Haven, 1932–33), text, 1, chap. 67, pp. 40–41; trans., 2, pp. 42–44.

[9] *Ibid.*, 1, pp. 114–115; 2, pp. 120–121.

[10] *Ibid.*, 1, pp. 40–41.

and screen it through a fine sieve, and adding to it the barley, cook it half and half with water, boiling it fast in a pot, and having cooked it thoroughly, sift it through a fine sieve and then there will be a strong glue. That glue must be poured over the plaster and a (layer) of pure oat flour spread over it, and a spare layer. Also I have heard it said that one may add to that plaster some cow gall, and all the mixture should be kneaded by hand, so that it is well pounded and pulls like a wheat flour dough. And that plaster should be spread on the walls unsparingly, so that there is a thick layer.[11]

The manual calls this the "old masters" preparation and comments that it will last forever.[12]

Finally, we have the account in the *Painters' Guide* compiled by Dionysios of Fourna. He writes that he will instruct us in the manner of painting of Panselinos, a late Byzantine painter, and there is little in these technical instructions to suggest that the *Guide* does not represent mediaeval practice. It is, however, a source which must be used with reserve since the text used by Didron differs in many places from that published by A. Papadopoulos Kerameus, and there are a number of other manuscripts of it which have not as yet been published or collated. No doubt much further information will be gained when this is done.

The *Guide* has three paragraphs on the slaking of lime in a trough, on the mixing of it with straw, and on the mixing of it with tow.[13] Both straw and tow should be free from dust and dirt, and, after pounding one or the other of these together with the lime and plenty of water, the mixture should be left for two or three days, when it will be fit for use in plastering. Dionysios of Fourna does not state exactly how many layers you should put on a wall, but he seems in the following paragraph to advocate two, and he is aware of the differing porosity of brick, stone, and mud, and of the importance of soaking bricks very carefully before plastering over them.

A comparison of these literary sources with the Tables of Examples of plastering (following plates) suggests some points of interest:

First, some of the texts indicate that it was the painter—not the masons who built the building—who was responsible for plastering the walls. Cennini[14] and Dionysios of Fourna,[15] agree in this, and they are supported by the evidence

[11] Nikolai I. Petrov, "Tipik of Church and Mural Painting," *Zapiski*, The Russian Archaeological Society, N. S., nos. 1, 2 (St. Petersburg, 1899), XI, p. 34. I am indebted to Mrs. D. Obolensky for the translation.

[12] The receipt is quoted by Iu. N. Dmitriev, in "Zametki po tekhnike russkikh stennykh rospisei X–XII VV," *Ezhegodnik Instituta Istorii Iskusstv* (Moscow, 1954), p. 247, note 2 (I am indebted to Mrs. D. Obolensky for the translation of the whole of Dmitriev's very valuable article.); and by Zdravko Blažić, *The Technique and Conservation of Our Frescoes* (Skoplje, 1958), pp. 8–9, in Serbian.

[13] A. Papadopoulos-Kerameus, ed., Dionysios of Fourna, *Hermeneia tes zographikes technes* (St. Petersburg, 1909), pars. 54–56, pp. 37–38, in Greek; M. Didron, *Manuel d'iconographie chrétienne* (Paris, 1845), pp. 56–57, which contains a French translation of Dionysios of Fourna.

[14] *Handbook*, ed. Thompson, 1, chap. 67, p. 40; 2, p. 42; Ugo Procacci, *La tecnica degli antichi affreschi e il loro distacco e restauro* (Florence, 1958), p. 3. Thompson quotes the above passage from Cennini and makes the point about responsibility for plastering.

[15] A. Papadopoulos-Kerameus, *op. cit.*, pp. 37–38; M. Didron, *op. cit.*, pp. 56–57, p. 65 for Father Joseph.

of plaster patches, which will be discussed below. There is also Didron's account of Father Joseph at work at Esphigmenou, which is probably the only live account that we shall ever have of a Byzantine painter at work. It may be objected that it is not legitimate to use an account of a monk painting in the early nineteenth century as evidence of Byzantine practice, but it will be seen that almost every stage of the painting procedure that we find in Byzantine wall paintings is described by Didron, and the burden of proof lies in this case with those who would exclude Father Joseph's methods as legitimate evidence.

Second, the composition of wall plasters has varied but little across the centuries, with lime remaining as the stable ingredient and sand or marble dust, or broken up brick or pottery as the filler. To these a binding agent of fibrous matter such as flax, hemp, straw, or chaff has sometimes been added. Fibrous binders were used in wall plasters by the ancient Greeks and may well be among the earliest form of binder for a building material, since they appear in the mud brick constructions of prehistoric times. From S. Maria Antiqua onward the tables show that there are many examples of these binders. Of the fillers, sand appears in small quantities in the plasters from Macedonia;[16] it appears in a moderate quantity in the Baptistery of Concordia Sagittaria, and in large quantities in the rock-cut churches of Cappadocia where, as visitors will know, it is a plentiful material which is practically impossible to avoid. Pounded brick or pottery fragments are less easy to find in plasters, but they were used in Russia up to the twelfth century[17] and continued in use in lime mortars in Byzantium up to the fall of that city, and I have seen them in two late Byzantine churches of uncertain date in the hinterland of Trebizond.[18] Marble dust is difficult to detect without chemical analysis and so also are fat content as recommended in the Lucca and *Mappae Clavicula* receipts and the more exotic ingredients of Bishop Nectarios' receipt; even a summary account of the use of these is not within the bounds of possibility here. Blažić summarizes his views on the content of Macedonian plasters by saying that the only principle involved was to use as much lime as possible.[19] Dmitriev sums up his account by speaking of plasters with fibrous binders or pounded brick fillers as representing two different technical traditions[20]. To elevate the matter to a discussion of technical traditions seems to be unwarranted by the evidence we possess at the moment and I would rather end with the observation that the choice of both filler and binder may well have been conditioned by the availability of materials at the particular time and place that wall paintings were being made. Thus, if our sources are adequately representative, there seems to have been no historical

[16] Z. Blažić, *op. cit.*, pp. 11–12.

[17] Iu. Dmitriev, *op. cit.*, pp. 245–246.

[18] In an article in *Anatolian Studies*, 12 (1962), p. 139, I stated wrongly that no crushed brick was to be found in late Byzantine mortar along the Pontic coast. Further survey work has produced examples of it, proving once again how dangerous it is to make dogmatic assertions about Byzantine objects when so small a percentage of them are left for us to work upon and so many are still to be found.

[19] *Op. cit.*, pp. 19–20.

[20] *Op. cit.*, pp. 248–249.

development in the composition of plasters over the period we are interested in, unless it be in the addition of some fat content to the plaster as testified by the receipts from the Lucca Manuscript and the *Mappae Clavicula*, and as exemplified in the plaster of Berzé-la-Ville. Mercier describes the latter as follows:—

A ground of lime wash containing yellow ochre

A thick rendering of rough-cast made up of three parts sand, one part lime, and chopped straw

Thin white limewash

Thin white limewash with azurite blue mixed in

A fine surface plaster of lime and sand and some fat content.[21]

Without personal inspection of a monument criticism is dangerous, but it may be suggested that the peculiar layer system which Mercier here describes was not all made for a single period of painting. The two limewashes with color in them are hard to understand since they were concealed under the opaque surface plaster. The ground limewash with yellow ochre in it might rather be an initial painted decoration in itself, or a preliminary drawing for a painting carried out on layer four. The paintings described by Mercier would thus represent a second or third decoration. It seems particularly odd that a painter should have lavished the relatively precious material azurite on his plaster base where it could perform no function even as a color modifier since it was covered by an opaque surface plaster.

Third, the Roman rendering of wall plasters as described by Vitruvius and Pliny and as exemplified in villas at Rome and Pompeii stands out on its own; systematic, time-consuming, heavy, and efficient, it reflects in microcosm all those qualities which made the Romans so great in constructional engineering. Apart from the questionable example of the painter at Berzé-la-Ville, predecessors to the Romans, some even of their contemporaries, and all of their mediaeval successors have been content with making their paintings on thin plasters of from one to three layers deep and of only a few centimeters in thickness (fig. 1).

SIZE OF PLASTER PATCHES

From the composition and layering of the plaster we can move on to consideration of the size of the areas of wall which were plastered at one time. This is a matter of great importance in determining whether paintings were made on fresh or dry plaster. The joins between different patches of plaster can be hard to detect if the plasterer was a careful worker. However, a raking light will usually show up the point of under- and overlap of two patches, or if light is not available, the join can be detected by feeling over the plaster with the finger tips (figs. 2, 7c).

At this stage we must enter into a dispute in which Vasari was the first advocate when he told us that much the finest and greatest method of painting

[21] *Op. cit.*, pp. 66–67.

on a wall was what he called *il fresco*.[22] On the one hand his opinion has been dignified by popular acceptance, but misunderstood in having been generally interpreted to mean that any good wall painting is a *fresco*; on the other hand for a hundred years painters and art historians have argued about what constitutes *fresco buono* and where examples of it are to be found. The argument has until recently been centered on *fresco buono*, and what is thought of as its antithesis, *fresco secco*, and much learned comment has been expended in an endeavor to fit whichever wall paintings were in question into one or the other of these two categories. More recently, in recognition of wall paintings made in both *fresco* and *secco*, a compromise term, *ad affresco*, has come into use, but this only complicates the terminology still further.

Clarity demands a restatement of the definition of these two terms as well as of other Italian terms used for the description of plaster, but this having been done, the use of them here will as far as possible be avoided, since it seems to me misleading to try to define Byzantine methods of wall painting in Italian terms which do not fit the case.

Fresco, then, is simply the Italian word for "fresh"; *fresco buono*, literally "fresh good," is the name given to a method of painting on damp plaster with pigments mixed with water so that as the plaster dries a chemical change in the lime takes place whereby the calcium hydrate absorbs carbon dioxide from the air and becomes calcium carbonate, the crystals of which bind the particles of pigment firmly into the surface of the plaster. *Fresco secco*, literally "fresh dry," is the name for painting upon dry plaster with pigments in any medium or tempera whatever.[23]

The first Italian term explanatory of areas of surface plaster is *pontata* which Tintori and Meiss give as derived from *ponte*, the word for a stage of the scaffold, and as meaning large rectangles of surface plaster characteristic of *secco* painting.[24] The second is *giornata*, the word for "day" borrowed to denote an area of surface plaster such as could be painted in a single day. These two terms, like *fresco* and *secco*, constitute a false antithesis, and are of only limited use in the effort to explain what methods of painting were employed.

With the exception of Cennini our written sources are silent as to the amount of plaster which might be rendered in one day, but he at least gives specific instructions for painting on wet plaster. He tells us that the preliminary drawing is to be composed upon the base plaster when it is dry, and that this ground is to be wetted before rendering the surface plaster over it, and he gives us an example of a day's work: a plaster patch of sufficient area for the painting of

[22] Giorgio Vasari, *Le vite de' più eccellenti pittori scultori ed architettori*, anno. and com. Gaetano Milanesi (Florence, 1878), 1, "Della pittura," chap. 5, pp. 181–182; trans. in G. Vasari, *On Technique*, tr. L. S. Maclehose, ed. G. Baldwin Brown (London, 1907), chap. 5, par. 81, pp. 221–222. Vasari was preceded by Cennini and Vitruvius in lauding the fresco process, but it is Vasari's views that have formed the basis of modern comment.

[23] Rutherford J. Gettens and George L. Stout, *Painting Materials. A Short Encyclopedia* (New York, 1942), pp. 238–239, give a full chemical description of the process. I am well aware that my shortened definitions are open to criticism and omit much, but, since I shall not use the terms, it is not germane to the purpose of this paper to go into the matter further.

[24] Leonetto Tintori and Millard Meiss, *The Painting of the Life of St. Francis in Assisi* (New York, 1962), pp. 6, 8.

one head.[25] For painting on a dry wall he makes no recommendations, except when an oil medium is used, "as the Germans are much given to do," and for this, in chapter ninety, he writes: "Plaster the wall the way you do for fresco; except that where you do the plastering little by little, here you are to plaster the whole job all at once." By "job" he must mean the whole composition or scene, which, as we shall see below, was the usual factor by which a Byzantine painter determined the area he wished to plaster. The area of base plaster is not specified in either type of painting, but for a painting on fresh plaster it was clearly at least large enough to contain one complete scene, since Cennini instructs us how to compose the entire scene upon it.

It will be seen from the Tables of Examples (following plates) that known sections of surface plaster can range in size from complete walls, as at Castelseprio and Dura, down to whole scenes and on down through a great variety of sizes and shapes of plaster patch to a piece as small as a single head, as recommended by Cennini and exemplified in several scenes at Assisi.

The preference for plaster joins corresponding to whole compositions seems so widespread in Byzantine examples that we must regard it as being typical of Byzantine painting (figs. 1b, 2a). However, it was not an immutable method, and large compositions such as the Koimesis at Sopoćani and in St. Clement at Ohrid, or the Ascension in the vault and the Angel Procession in the dome of St. Sophia at Trebizond, were split up into several sections, in a manner which must have been conditioned partly by consideration of elements in the composition and partly by convenient heights of scaffolding (fig. 7c). Also, in two examples from St. Sophia at Trebizond and from Nova Pavlica we have very small areas of surface plaster for the repainting of heads, and for the painting of a group of people, where the join follows the shape of the heads or faces (fig. 2c, d, e). Both examples are late in date, but it is quite possible that closer observation will in time reveal many more of the small joins in Byzantine paintings. For early Christian and Romanesque painting in Europe we lack information, about plaster joins, but I venture to predict that large joins corresponding with the borders of compositions or the stages of the scaffold will be found to be characteristic of the whole period. Smaller patches of plaster seem to be more typical of Italy, and, specifically, they appear in wall paintings of the Roman period and in Italian wall paintings from the thirteenth century onward, but no doubt links between these two types will be found. The sizes of plaster patch increase in extent from an area for one head, and the shape varies from more or less rectangular patches—which are extended only to contain some element in the composition—to shapes which are related to single elements in the composition and thus follow the form of a figure or a building.

POLISHING OF WALL PLASTER

The next problem connected with wall plaster is the polishing process. Vitruvius again provides us with a starting point when he says of the plaster

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[25] *Handbook*, ed. Thompson, 1, chap. 90, p. 56; 2, pp. 57–58; *ibid.*, 1, chap. 67, pp. 40–42; 2, pp. 42–45.

layers: "After they are rendered solid by the use of plasterer's tools and polished to the whiteness of marble, they will show a glittering splendour when the colours are laid on with the last coat."[26] Interpretation of this passage is widely disputed and perhaps the simplest and safest manner of approaching it is to follow the literal translation. Vitruvius tells us to polish the layers of plaster and to include colors in the surface layer so that when it is polished we have a smooth, glittering, colored surface.

Our next source is Cennini who in chapter sixty-seven, may be describing a type of polishing process to follow the laying on of the patch of surface plaster:

> Then take your large bristle brush in your hand; dip it in clear water; beat it, and sprinkle over your plaster. And with a little block the size of the palm of your hand, proceed to rub with a circular motion over the surface of the well-moistened plaster, so that the little block may succeed in removing mortar wherever there is too much, and supplying it wherever there is not enough, and in evening up your plaster nicely. Then wet the plaster with that brush, if you need to; and rub over the plaster with the point of your trowel, very straight and clean. Then snap your lines in the same system and dimensions which you adopted previously on the plaster underneath.[27]

By the point of the trowel Cennini must refer here to the bottom of the base of a curved trowel, since it would be impossible to smooth the surface of the plaster with the point, unless he means that the snapped lines referred to in his last sentence are now to be incised. The former, however, seems the more likely explanation since two or three lines later he repeats: "When you have got the mortar of your plaster all smoothed down . . . ." The process taught by Cennini has been described as water polishing.[28]

Dionysios of Fourna tells us to polish the surface plaster after wetting it with water and then to begin laying out the composition with compass and ochre brushwork. Afterward: "Polish the surface well and straight away use black; then polish and put in there a proplasm. Take care, however, to finish in less than one hour as much as you have polished; because if you are too slow a crust will form on the surface which will not absorb the colors and they will later flake off."[29]

Turning to the monuments, it is clear that the Romans had developed a highly efficient method of polishing plaster surfaces. There has been much argument over the methods used, but apparently they sometimes incorporated single colors into their polished surface plaster to give brilliance to the background of a picture.

It appears that some simple form of polishing process continued to be used for some of the Catacomb paintings.[30] Turning to Byzantium, we find that some

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[26] *Architecture*, ed. Granger, 2, Bk. 7, chap. 3, pp. 92–93.

[27] *Handbook*, ed. Thompson, 1, pp. 41–42; 2, p. 44.

[28] Christiana J. Herringham, *The Book of the Art of Cennino Cennini* (London, 1922), p. 201.

[29] A. Papadopoulos-Kerameus, *Hermeneia*, chap. 58, p. 39; M. Didron, *Manuel*, p. 57.

[30] Alexander Eibner, *Entwicklung und Werkstoffe der Wandmalerei* (Munich, 1926), p. 330. He derives the polishing process from the ancient Egyptians, p. 50.

Georgian churches have wall plaster with a highly smoothed surface which to my mind would qualify as polished.[31] In St. Sophia at Trebizond some areas of plaster are smoother than others; in the dome which was constructed of brick, a highly porous material, the plaster dried too quickly for the workers and a multitude of hair cracks testify to the fact that they were not overly concerned about the smoothness of their surface plaster (figs. 7 a, b, c). At Asinou in Cyprus a red border line was painted around the base of the conch, and smearing of the color shows that the plaster was again trowelled after the color had been applied to the surface (fig. 1 c). In the south apse of the narthex of Asinou the plaster surface for the figure of St. George has been so carefully smoothed that it would seem to qualify as a polished surface. The dates of these two areas of painting have been variously assigned between the thirteenth and fifteenth centuries.

There appears to have been a closing in of the surface plaster before painting was begun at the Kariye Djami in Constantinople.[32]

In western Europe, a painted column at San Zeno in Verona is said to have a polished plaster surface,[33] and there is another Romanesque example from the eleventh century in the church at Burgfelden in Württemberg.[34] In France the surface plaster for the Romanesque paintings at Berzé-la-Ville is said to be finely polished but the process of polishing is not explained unless it be by the *Mappae Clavicula* receipt which calls for the addition of some fatty matter to the plaster and recommends hog's fat as one of the ingredients.[35] In general there is too little evidence at present of the use of a polishing process in Romanesque wall paintings and it is not surprising that some authorities have disagreed about it.[36]

For the thirteenth century in Italy we have examples in the painted borders of the Arena Chapel and of the lower church at Assisi. Here the paint has been polished or ironed into the surface plaster of the painted marble panels in a medium of some kind of saponified oil, thus giving an effect of hard brilliance which is very similar to the surface of real marble.[37]

As to the nature of the polishing process, it is clear that it is simply an extension of the normal and necessary final operation of the plasterer who works over his plaster in order to consolidate it, even up its surface, and close in any hair cracks that may appear through a too rapid drying of the surface. Our principal interest lies in the nature of the extension of this process. Blažić remarks that the trowelling brings a film of lime to the surface, which must at least be dry enough not to cause the pigment to run when it is applied.[38] The

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[31] In Dörtkilise, Haho, Işhan, and Öşk Vank.

[32] Paul A. Underwood, *The Kariye Djami*, 3 vols. (New York, 1966), 1, pp. 304–306.

[33] E. Berger, *op. cit.*, p. 205.

[34] A. Eibner, *op. cit.*, p. 309.

[35] F. Mercier, *op. cit.*, pp. 43, 67.

[36] G. Loumyer, *Les traditions techniques de la peinture médiévale* (Brussels–Paris, 1914), p. 90, says that the polishing process fell into disuse. A. Eibner, *op. cit.*, declares that some sort of polishing process continued.

[37] A. Eibner, *op. cit.*, p. 331; L. Tintori and M. Meiss, "Additional Observations on Italian Mural Technique," *The Art Bulletin*, 46, no 3 (September 1964), pp. 378–379, figs. 3, 7.

[38] *Op. cit.*, p. 20.

instructions given by Dionysios of Fourna are somewhat ambiguous. According to the translation by Didron, he states that you should polish your surface both before you lay on your colors and after you have laid on the ground color for clothing. This would perhaps indicate something akin to a polishing of a colored surface to give it brilliance.[39] On the other hand the Papadopoulos-Kerameus text does not seem to indicate this, and Professor Underwood interprets it as a simple instruction for the closing in of the surface and for bringing moisture to an overly dry surface.[40] Dmitriev is of a similar opinion, and remarks that the brilliance of the surface is dependent upon the care with which it is smoothed down.[41] Cennini's description of the process would seem to lend support to the view that only a traditional and necessary operation is in question. The ingredient of fat in the Lucca and *Mappae Clavicula* receipts may indicate a rather different approach, namely, the building of a polishing ingredient into the plaster mixture, since working over it would presumably bring oil to the surface as it would water;[42] and the complex ingredients of Nectarios' receipt may also be explained as means for obtaining a brilliant surface;[43] or they may function as agents delaying the drying out of water from the plaster. This, however, is a matter of conjecture.

As an advancement upon the simple smoothing of the plaster we have from the Arena Chapel the Giotto example of polishing the colored background surfaces, and a similar process or processes used by Roman plasterers and painters. The links between the various processes, if links there are, will be found on the walls of Byzantine churches and in the *maniera graeca* of Italy. It must remain sufficient for the moment to observe that the Byzantines were great lovers of brilliance and it is likely that they made use of older methods of polishing and perhaps invented new methods with or without the inclusion of colors in the plaster surface. They satisfied their love of brilliance wherever they could afford it in churches whose walls and vaults they illuminated with mosaic work, and when they could not afford or obtain mosaic, as at Mileševo and Sopoćani, they found a substitute brilliance in the form of gilded backgrounds, in imitation of mosaic, and in gilded haloes.[44]

EVIDENCE FOR PAINTING ON FRESH OR DRY PLASTER

The last step before leaving the problem of the plaster foundation of our paintings is to review the evidence, already touched upon, as to whether or not the plaster was fresh when the painting began. Vitruvius is quite explicit in

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[39] *Manuel*, p. 58. G. Loumyer, *op. cit.*, p. 93, assumes this sense of the meaning.

[40] *Op. cit.*, I, pp. 305–306.

[41] "Zametki po tekhnike," pp. 263–264.

[42] J. Burnam, *Classical Technology*, text p. 15, trans. p. 81; Thos. Philipps, *op. cit.*, p. 209.

[43] N. Petrov, *op. cit.*, p. 34.

[44] Other examples of gilded haloes are at Asinou, A.D. 1105–1106, at St. Chrysostomos, Koutsovendis, early twelfth century, both in Cyprus, and at St. Sophia, thirteenth century, in Trebizond. The magnificent figure of St. George in the narthex at Asinou has, in addition, gilded body armor and horse trappings. The writer believes this painting to be late twelfth century.

Book Seven, where he writes: "When the colours are carefully laid upon the wet plaster, they do not fail but are permanently durable...."[45] Pliny has two passages relevant to the problem; the first is in Book Thirty-three, where in describing ochres, he says: "This and the Attic kind they use for painting different kinds of light, but only marbled ochre for squared panel designs, because the marble in it resists the acridity of the lime."[46] The implication here would be that with the squared panels the pigment was put on the fresh plaster, and it also implies the rendering of only small sections of surface plaster. There is the further point that these marbled patches may have been fresh, as opposed to other parts of a painting which were on dry plaster. In the second passage in Book Thirty-five, he is quite specific in writing: "Of all the colours those which love a dry surface of white clay, and refuse to be applied to a damp plaster, are purple, indigo, blue, Melian, orpiment, Appian, and ceruse."[47] From Pliny we must jump once again to the Lucca Manuscript which has a brief and ambiguous passage: *Ita memoramus omnium operationes qui in parietibus simplice, in ligno cere commixtis coloribus in pellibus ictiocollon commixtum.*[48] A literal translation of this reads: "Thus, we note operations of all, which on walls with simple, on wood with colors mixed with wax, on skins fish glue being mixed." To render the *simplice* of this passage as "simple" and to interpret this as a shortening for "in the simplest manner," meaning, in water, needs less modification of the text than many commentators have found necessary. This interpretation is strengthened by the slightly clearer version in the *Mappae Clavicula*, of approximately the same date, which reads: ... *ista memoramus omnium operationes, qui in parietibus simplicem, in ligno cere commixtum suscepit lignum simplicem cum unctione collon commixtum.*[49] Painting on a wall with water makes sense only if you are painting on fresh plaster; thus, we have here a probable reference to this manner of painting in the early middle ages.

Our next source is the treatise, *De diversis artibus*, by Theophilus, dating probably from the early twelfth century,[50] and I quote chapter two of Book One—as given in Dodwell—in the Latin, since there is some question as to the exact meaning of the relevant passages. Theophilus writes: *Qui prasinus est quasi confectio quaedam habens similitudinem viridis coloris et nigri, cuius natura talis est, quod non teritur super lapidem sed missus in aquam resoluitur et per pannum diligenter colatur; cuius usus in recenti muro pro viridi colore*

[45] *Architecture*, ed. Granger, 2, Bk. 7, chap. 3, pp. 92–93.

[46] *Natural History*, ed. and trans. H. Rackham (Loeb) (London, 1952), 9, Bk. 33, chap. 56, pp. 118–119.

[47] *Ibid.*, Bk. 35, chap. 31, pp. 296–297.

[48] For discussion of the meaning of this passage, see the following: J. Burnam, *op. cit.*, text, p. 46, trans., p. 109. His translation is incomplete in that it does not include the word *ictiocollon* which occurs in other receipt books and is normally translated as fish glue. Hjalmar Hedfors, *Compositiones ad tingenda musiva* (Uppsala, 1932), text, p. 33, trans. and commentary, pp. 153–154; C. Herringham, *op. cit.*, intro., pp. xxiv–xxv; Arthur P. Laurie, *Greek and Roman Methods of Painting* (Cambridge, 1910), p. 111; also *idem, The Materials of the Painter's Craft in Europe and Egypt from Earliest Times to the End of the XVIIIth Century* (London–Edinburgh, 1910), pp. 107, 144; E. Berger, *Fresko-, Oel-*, p. 18; F. Mercier, *op. cit.*, p. 198; G. Loumyer, *op. cit.*, pp. 91–92.

[49] Thos. Phillipps, "Mappae Clavicula," *Archaeologia*, 32, p. 224.

[50] Charles R. Dodwell, ed. and trans., *Theophilus; The Various Arts* (London, 1961), for the most recent discussion of this work.

satis utilis habetur.[51] In translation: "Prasinus is so made as to have a likeness to viridian mixed with black, and the nature of it is such that it is not ground upon stone, but, having been put into water, it is dissolved and then strained carefully through a cloth; the use of it is satisfactory enough as a green color for a fresh wall." The first part of this is clear enough in stating that we have a color mixed with water. The last part is surely a clear indication of painting on fresh plaster, although most of the Theophilus commentators ignore it. The word *recens* is given by Lewis and Short as "that has not long existed, fresh, young, recent,"—different from *novus.*[52] Baxter and Johnson give "fresh and quote *aqua rescens* as "fresh water";[53] and Souter translates *recento* "refresh."[54] If we use the translation "fresh" in the above passage, we get "on a fresh wall," which can only be an abbreviation of "on a wall with fresh plaster on it." We shall return to chapter two when considering colors, but meanwhile it is worth comparing *recens*, meaning "fresh," with Cennini's first use of the word "fresh" or *fresco* as a shortening for "fresh plaster." The latter probably derives from the former through texts now lost or through inherited usage among painters and plasterers, and the term is still used today.[55]

In chapter fifteen of Book One Theophilus writes: *Cum imagines vel aliarum rerum effigies pertrahuntur in muro sicco, statim aspergatur aqua tamdiu, donec omnino madidus sit. Et in eodem humore liniantur omnes colores qui supponendi sunt, qui omnes calce misceantur et cum ipso muro siccentur, ut haereant.*[56] A literal translation of this passage reads: "When figures or representations of other things are portrayed on a dry wall, thereafter it is sprinkled with water for as long a time as will make it all wet. And in that liquid are spread over all colors which are to be put underneath, which may all be mixed with lime, and may dry with the wall itself, so that they may adhere to it."[57] The first point of importance is that the paragraph begins with a conditional clause, and it is possible, therefore, that Theophilus knew of another method of painting on walls, as is indicated in the passage in Book One, chapter two, on the color green. Next, we have the ambiguity of the second sentence. It has been assumed by the translators that *in eodem humore* refers to the wet wall, but, taken literally, as we have seen above, it refers to the colors, not to the wall. Third, we have

[51] Ed. Dodwell, *ibid.*, Bk. I, chap. II, p. 5; John G. Hawthorne and Cyril S. Smith, *On Divers Arts. The Treatise of Theophilus* (Chicago, 1963), Bk. I, chap. 2, p. 16; Charles de L'Escalopier, *Théophile. Essai sur divers arts* (Paris, 1843) I, 2, p. 12; E. Berger, *op. cit.*, p. 46; Charles L. Kuhn, *Romanesque Mural Painting of Catalonia* (Cambridge, Mass., 1930), pp. 70–71; Robert Oertel, "Wandmalerei und Zeichnung in Italien," in *Mitteilungen des Kunsthistorischen Instituts in Florenz*, 5 (1940), p. 277, and note 108.

[52] Charlton T. Lewis and Charles Short, *A Latin Dictionary* (Oxford, 1951).

[53] James H. Baxter and Charles Johnson, *Medieval Latin Word-list from British and Irish Sources* (London, 1934).

[54] Alexander Souter, *A Glossary of Later Latin to 600 A.D.* (Oxford, 1949).

[55] Harry Parker, Charles M. Gay, and John W. McGuire, *Materials and Methods of Architectural Construction* (New York, 1948), chap. 12, p. 174. I am indebted to Mr. Robert L. Van Nice and his assistant Mr. John Wilson for this information.

[56] Ed. Dodwell, *op. cit.*, p. 13, prefers the reading *superponendi*.

[57] For other translations and discussions of this passage, see: J. Hawthorne and C. Smith, *op. cit.*, chap. 15, p. 23; Mary P. Merrifield, *The Art of Fresco Painting* (London, 1846), pp. 17–18; E. Berger, *op. cit.*, pp. 44–45; A. Eibner, *op. cit.*, p. 365; A. Laurie, *Materials of the Painter's Craft*, pp. 112–113.

the alternative readings of *superponendi*, preferred by Dodwell, and *supponendi* which he gives as coming from three of the manuscripts, while Hawthorne and Smith, who prefer the latter, state that it comes from four manuscripts. My preference is for *supponendi*, for reasons which will be referred to below, when the putting on of color is discussed. Finally, we are left with the problem of *qui omnes calce misceantur*. I suggest that this means colors "which may all be mixed with lime." To translate it thus does no injustice to the text and adheres once again to the literal meaning. Here and elsewhere I have modified the interpretations of previous translators with some trepidation. I have no pretensions to being an expert linguist, and my modifications have their origin in an attempt to make sense of the mediaeval texts by relating them to the methods of work which Byzantine and mediaeval painters reveal in their wall paintings.

It is by no means as clear, as Berger and others have stated,[58] that Theophilus knew only of painting on dry plaster, since we have, first, in chapter two, the clear mention of a fresh wall; second, the temporal clause in chapter fifteen, implying an alternative to dry walls; third, the ambiguity of the phrasing; and last, the fact that he knew that wet lime had something to do with the adherence of the colors.

After Theophilus, our next source is Cennini, who makes, in his chapter sixty-seven, a perfectly clear statement of the method of painting on small patches of fresh plaster that can be finished during one day; for this, he says, "is the strongest tempera and the best and most delightful kind of work."[59] However, it is clear from other statements, in chapters seventy-seven and eighty-six, quoted below, that he knew that work on fresh plaster alone was inadequate, and that a painting always had to be finished on dry plaster.

After Cennini we have Dionysios of Fourna whose instructions about the importance of beginning on fresh plaster are equally clear: "During the winter put on plaster in the evening and straight away apply the lime and tow so that it should hold, while in the summer do whatever may be convenient for you, and while you are applying the lime and tow level it up well, and leave it for a short time until it sets, and then draw upon it."[60] Later he continues with the passage already quoted above: "Take care however to finish in less than one hour as much as you have polished because if you are too slow a crust will form on the surface which will not absorb the colors and they will slip down."

Finally, there are three Russian sixteenth-century manuals which refer to the necessity of beginning on the fresh plaster, but of finishing off in tempered colors.[61]

As a supplement to these texts, we have Didron's report of Father Joseph's method of painting in the narthex at Esphigmenou. Didron says that Father

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[58] *Ibid.* His opinion has been accepted by Loumyer, Herringham, Thompson, Eibner, and Tintori and Meiss.

[59] *Handbook*, ed. Thompson, 1, chap. 67, pp. 40–45; 2, pp. 42–47.

[60] A. Papadopoulos-Kerameus, *Hermeneia*, pp. 38–39; M. Didron, *Manuel*, pp. 57–58.

[61] Iu. Dmitriev, *op. cit.*, pp. 257–261.

Joseph let his surface plaster dry for three days before beginning to paint upon it; but no longer than that since it would then have been too dry to absorb the colors. Although the three-day interval seems long, it is clearly implied that Father Joseph wished to paint on the fresh plaster.[62]

Tables II–VI (following plates) show that some Byzantine and mediaeval painters began their work on fresh plaster and further evidence of this will appear below, but meanwhile it may be useful to summarize the discussion of the plaster grounds for wall paintings. Byzantine painters exhibit a definite preference for a mode of plastering which makes the joins in the surface plaster coincide with the decorative borders to scenes, a neat system which implies that they were concerned at least to begin their painting on the fresh plaster. Had it not been for this preference, they could have used the much easier and more economical (of both time and labor) system of rendering in a single operation all the surface that could be reached from the available scaffolding, or even of rendering a whole wall, as at Castelseprio and Dura. That this was not done can be explained only by the supposition that it was desirable to have fresh surface plaster. De Capitani D'Arzago maintains that at Castel-seprio painting was begun on the fresh plaster despite the fact that whole walls were rendered with surface plaster in one operation. He reasons that the painter began work high on the walls while the plasterers were still at work lower down, and that he worked with great speed. At Dura the painting is said to be wholly on dry plaster, but the description of the flaking away of upper layers of paint, leaving the brush drawing exposed, is at least suggestive that work was begun on fresh plaster, since layers of paint do not necessarily denote dry plaster painting, as will be seen below. Dmitriev, Underwood, and A. H. S. Megaw and E. J. W. Hawkins, all agree that the Byzantine paintings which they discuss were begun on fresh plaster. The case is strengthened, as Dmitriev points out, and as my observations at Trebizond and at Nova Pavlica show, by examples of large scenes where the surface plaster is made up of several sections, and by the examples of small patches of surface plaster inset for the purpose of altering or repainting parts of scenes. More examples of these smaller patches of surface plaster will, I am sure, be found as Byzantine wall paintings receive closer attention, and it may be that examples of entire paintings done on dry plaster will also emerge.

Our only Byzantine source, the *Painter's Guide*, confirms the view that painting was done on fresh plaster, as does also the very late, but nevertheless relevant, practice of Father Joseph. Fitting the Byzantine system into its historical context we find that it is preceded by various methods of work. Painting on fresh plaster originated in Egypt and continued in the Roman and late Roman periods, but there is also plenty of evidence that some wall paintings, and parts at least of others, were executed on dry plaster; again, however, it seems to me quite likely that painters may have begun their work on fresh plaster. For Western Europe, in the long period between the introduction of Christianity as the official religion and the thirteenth century, our evidence is

[62] *Op. cit.*, p. 65.

scant, but, such as it is, it suggests that wall paintings were made sometimes on
on dry plaster, though more often they were begun on fresh plaster and finished
on dry. The researches of Tintori and Meiss make it quite plain that this
was true also in thirteenth-century Italy; that there too more than one method
of wall painting was practiced.

What then, is the explanation of the different sized patches of surface plaster ?
The most convincing approach toward an answer is to relate the patches to
a time factor, for a part of this problem is concerned with the length of time
necessary for the plaster to dry, thereby incorporating pigments into a crystal-
line surface of calcium carbonate. Laurie is of the opinion that plaster of
the thickness recommended by Vitruvius would take some time to dry since
the carbonization of lime is a slow process; he is not specific as to how long
but he must mean a period of some days at least, and he suggests delaying
the process by the addition of water, thus bringing "fresh unaltered lime to
the surface of the plaster for many days." Another of his delaying aids
would be to put a damp cloth over the surface, and he concludes: "The
particular technique of using small plaster patches is not essential as a cri-
terion for painting on fresh plaster."[63] In partial contradiction of this Gettens
and Stout, discussing lime plaster, write that "little absorption of atmo-
spheric carbon dioxide takes place until mortar is fairly dry." They contradict
Laurie by stating: "The process of carbonization is much accelerated by
subsequent periodic wetting of the mortar."[64] This is a matter for chemists to
resolve. Personal experience in the use of lime plasters suggests to me that
climate and the environment of the plaster are two of the most important
influences on the speed of the carbonization process. In the dry climate of
Cyprus a plaster which appears to remain fresh for seven or eight days in the
winter, dries off within twenty-four hours in hot summer weather; whereas on
the Pontic coast of Turkey there was only a small difference of drying time
between seasons because of the continuous high humidity of the climate.
Examples of environmental influence on the carbonization process are brick
or porous stone walls supporting the plaster which will quickly draw off the
moisture in the lime, whereas an impervious stone wall will allow the lime to
hold its moisture and dry off more slowly. Other considerations are the age,
thickness, and dampness of the mortar of the wall over which the plaster is
rendered, and the quality of the lime used for a wall plaster as well as the time
taken in preparing it.

A second consideration relevant to the time factor is the speed at which a
painter could—or wished to—work. We shall return later to the question of
time and its importance in considering methods of painting, but the points
mentioned above are probably not the only ones involved, and even when the
factual questions are answered, we are left with the further question of how
much painters knew about the behavior of their plaster from cumulative
experience handed down from master to master.

[63] *Greek and Roman Methods of Painting*, pp. 83–84.
[64] *Op. cit.*, p. 239.

The Over-all Planning of a Wall Decoration

The first steps in decorating the walls of a church must have been a decision as to the number of scenes and figures that were to be painted and the working out of a plan to fit them into the space available for painting. Actual examples of this are of necessity scarce, since the evidence for preliminary planning is the first thing to be covered up when the work of painting begins. In the synagogue at Dura the plaster surface was divided horizontally into registers and then vertically into panels by means of painted lines.[65] At Castelseprio, the registers and the shapes of the scenes to be painted were marked on the base plaster by means of incised lines.[66] At Aachen some full-scale sketches of figures were made on parts of the stonework, and these may have been trials for painted or mosaic decorations, but the varying scale of other sketches suggests that these are rather to be thought of as sketches made by a painter or mosaicist to amuse himself while waiting to begin his proper work.[67] The order of individual saints had to be worked out wherever they were placed in rows, and there is evidence of this on a fragment of plaster from the church of the Saxon miners at Novo Brdo in Serbia where the name of St. Stephen, the first Christian martyr, is noted in black letters.[68] The same may very well be the case at Mileševo where the names Theodore, George, and Demetrius are noted in shortened form on the surface plaster in the naos next to the representations of those Saints. These have been taken to be the signatures of painters put near their saintly namesakes,[69] but the names were later covered up by the imitation gold mosaic background, and it seems much more likely that they are shorthand notes for the positioning of the Saints.

In St. Sophia at Trebizond evidence of preliminary planning was found in the southeast chapel, where faint red lines on the masonry of the walls indicated the divisions of the space into registers for scenes. The question of how this vital, practical task—on the ultimate aesthetic effects of which volumes of learned comment have been written in terms of the relationship of painting to architectural space—was achieved seems to have aroused little speculation.

The Preliminary Drawings for Wall Paintings

After the painter had decided about the divisions of the wall space of the church, his next task was to make a sketch on the wall as a guide for the painting of each scene, and in considering this task we are confronted by a root

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[65] Carl H. Kraeling, *The Synagogue. The Excavations at Dura-Europos, Final Report*, 8, pt. 1 (New Haven, 1956), p. 364.

[66] Alberto de Capitani d'Arzago, Gian Piero Bognetti, and Gino Chierici, *Santa Maria del Castelseprio* (Milan, 1948), pt. 3, p. 626.

[67] Paul Clemen, *Die romanische Monumentalmalerei in den Rheinlanden* (Düsseldorf, 1916), figs. 11–17; Edward Waterman Anthony, *Romanesque Frescoes* (Princeton, 1951), pp. 118–119, figs. 228–230.

[68] This fragment is now in the Museum at Priština. I am indebted to Mr. Ernest Hawkins for pointing out a better example at Agios Chrysostomos, Koutsovendis, in Cyprus, where four names are written in the corner of a painted dado in the southwest bay, presumably as a memorandum noting which saints were to be depicted there.

[69] Svetozar Radojčić, *Masters of Old Serbian Painting* (in Serbian) (Belgrade, 1955), pp. 11–16.

problem of artistic creation: the question of the origin of these sketches by mediaeval wall painters. Was the source a model book from which enlarged copies were made? Was it the imaginative powers of the master painter? Was it a sketch book in which the painter accumulated copies of other paintings or his own ideas? Or is the source to be found in traditional craftmanship, practice, and skill?

Our written sources may begin with Pliny, who has something of interest to say about drawing, although he never specifically mentions wall painting. Writing of the painter Parrhasius of Ephesus, he says: "And there are many other pen-sketches still extant among his panels and parchments, from which it is said that artists derive profit."[70] In chapter thirty-six he mentions the painter Apelles whose insistence on drawing a line a day passed into proverb;[71] and in chapter forty: "It is also a very unusual and memorable fact that the last works of artists and their unfinished pictures ... are more admired than those which they finished, because in them are seen the preliminary drawings left visible and the artists' actual thoughts, and in the midst of approval's beguilement we feel regret that the artist's hand while engaged in the work was removed by death."[72]

From Pliny onward the sources are silent about the importance of preliminary drawing until we come to Cennini's *Handbook*. Here we are told how to draw a whole scene in charcoal on the lower layer of plaster when it is dry, and to use measures and compasses to achieve the right placing and proportions of the parts of the scene. When this has been done, the whole outline is to be painted in in ochre: "without tempera, as thin as water ... shading as you did with washes when you were learning to draw. Then take a bunch of feathers, and sweep the drawing free of the charcoal.

"Then take a little sinoper without tempera, and with a fine pointed brush proceed to mark out noses, eyes, the hair, and all the accents and outlines of the figures; and see to it that these figures are properly adjusted in all their dimensions, for these give you a chance to know and allow for the figures which you have to paint."[73] When all this is finished, the surface layer of plaster goes on in sections suitable for a day's work, and the relevant part of the picture is brushed in again. Cennini uses the head of one figure as an example and prescribes the use of ochre for feature lines and green earth for the shadows and for emphasizing the ochre outlines. The ochre is again to be untempered and watery, and the green earth is also to be watery.

Here, then, we have a good and clear description of drawing on the dry base layer of plaster, and on the fresh surface plaster, but Cennini is not specific as to whether anything is drawn beforehand on a small scale as a guide. However, the introductory pages of his work are concerned with drawing and the importance of it, and it is all small scale drawing on panel, parchment, or paper. To argue that a mediaeval painter could not cope with differences of scale of work,

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[70] *Natural History*, ed. Rackham, 9, Bk. 35, p. 313.
[71] *Ibid.*, p. 323.
[72] *Ibid.*, p. 367.
[73] Ed. Thompson, 1, chap. 67, pp. 40–45; 2, pp. 42–47.

as does Oertel in partial explanation of the lack of model books or small sketches for wall paintings, is to wander into a world of painters whose strange limitations are hardly credible.[74] Moreover, Cennini appears to be unaware of any such limiting concepts. In chapter nine he writes: "If, by chance, when you are drawing or copying in chapels ...,"[75] which at once indicates the drawing or copying on a small scale of something that is large, a practice confirmed by the advice in chapters twenty-nine and thirty on how to avoid mistakes of measurement when copying from a painting high on the wall.[76] Elsewhere he advises: "Having first practiced drawing for a while as I have taught you above, that is, on a little panel, take pains and pleasure in constantly copying the best things which you can find done by the hand of great masters,"[77] and chapter twenty-eight reads: "Mind you, the most perfect steersman that you can have, and the best helm, lie in the triumphal gateway of copying from nature. And this outdoes all other models; and always rely on this with a stout heart, especially as you begin to gain some judgment in draftsmanship. Do not fail, as you go on, to draw something every day, for no matter how little it is it will be well worth while, and will do you a world of good."[78]

The first sentence of the chapter is important in that it gives a positive instruction to draw from nature, and this may well have played some part in inspiring the use of brush sketches upon the wall as preliminary to painting. The advice of the second sentence perhaps accounts for the odd sketches, irrelevant to any outline of a composition, that are occasionally to be found on walls. Such are some of the sketches at Aachen, and some at Trebizond, where the master painter or his pupils have amused themselves with the practice of drawing figures or details like hands while not occupied with the actual painting on the plaster (figs. 9a, b, 10a, b). Cennini has earlier stated the aim of drawing to be "that it will make you expert, skilful, and capable of much drawing out of your own head,"[79] and the importance which he attaches to it is clear from the fact that most of the thirty-four chapters comprising the first section of his book are devoted to it. However, he regards it as a preliminary exercise to painting, whether it be on wall, on panel, or in book; not as an art in its own right; and it is hard to see why he encourages us to draw and copy wall paintings if it is not for the purpose of using the drawing as an inspiration for a full-scale painting of our own.

From Cennini we pass on to Dionysios of Fourna, whose advice for the brush sketch on the wall appears to be a shortened version of that of Cennini, without the intial drawing in charcoal and without the two layers of plaster.[80] As to other drawing, he is much less informative than Cennini, but he does write in

[74] "Wandmalerei," p. 272 ff.

[75] *Handbook*, ed. Thompson, 1, p. 6; 2, p. 6.

[76] *Ibid.*, 1, pp. 16, 17.

[77] *Ibid.*, 1, chap. 27, pp. 14–15; 2, pp. 14–15.

[78] *Ibid.*, 1, p. 15; 2, p. 15. A more magnificent mixing of metaphors can rarely have been achieved, Thompson gives a comment on Cennini's rhetorical passages.

[79] *Ibid.*, 1, chap. 13, p. 8; 2, p. 8.

[80] A. Papadopoulos-Kerameus, ed., *Hermeneia tes zographikes technes*, par. 58, pp. 38–39; trans. M. Didron, *Manuel d'Iconographie chrétienne*, p. 58.

the preliminary exercises that one of the things a pupil must do is to draw a lot.[81]

There are no other contemporary texts with instructions for drawing, but there are two texts which refer to drawings as guides for wall paintings. One of them is the Life of St. Pancratius of Tauromenium, who writes of tablets and papyri which served as a guide for wall painters.[82] Another is a letter of about 1413 which speaks derisively of artists who are less inspired by their own painting than by looking at other peoples' creations: "Their eyes running hither and thither, they do not so much paint with colors as strive to gaze constantly upon a model,"[83] and the writer contrasts this attitude with that of a skilful painter like Theophanes, the Greek, who "when he was sketching or painting, no one saw him anywhere look upon models."

A further piece of indirect evidence comes from an inventory from the Pechersky monastery at Kiev which records that after the death of the painters of the Church of the Assumption, there were preserved "their clothes in the sacristy and their books." Of these books themselves no Byzantine examples are preserved, but among the manuscripts of the British Museum there is a late example of an Orthodox painter's sketch book containing a jumble of drawings of subjects ranging from details to whole compositions, sometimes sketched in rapidly and sometimes with meticulous care.[84] The best known Western European mediaeval examples are the Wolfenbüttel manuscript and the sketchbook of Villard de Honnecourt.[85] Earlier fragmentary examples are the Freiburg leaf and a few drawings from the Vatican.[86] The drawings in these examples are done on already used sheets of parchment, because parchment was a valuable commodity which was probably reused until it fell to bits. This could explain why no Byzantine examples have come down to us. It is hard to imagine that painters did not carry with them some means of drawing so that they could copy works which interested them and put down ideas for pictures; that no such notebooks are now preserved is very likely because a drawing was but the result of preliminary activity, rather than a thing of beauty in its own right. It was a utilitarian step in the craft of painting.

Some individual small drawings have been preserved from Italy, and of these Tintori and Meiss argue convincingly that they are probably preliminary studies for paintings.[87] Further evidence from Italy is given by Vasari who describes an example of a method of wall painting used by Simone Martini, "which method of painting was the cartoon that our old masters used to make for painting in

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[81] A. Papadopoulos-Kerameus, *ibid.*, p. 5; M. Didron, *ibid.*, p. 13.

[82] Ernst Kitzinger, *The Mosaics of Monreale* (Palermo, 1960), p. 49.

[83] Iu. Dmitriev, "Zametki po tekhnike," pp. 264–265.

[84] British Museum, add, MS no. 43868. I owe thanks to Professor Mango for drawing my attention to this book.

[85] Hans R. Hahnloser, *Das Musterbuch von Wolfenbüttel* (Vienna, 1929); Kurt Weitzmann, *Zur Byzantinischen Quelle des Wolfenbüttler Musterbuches*, in *Festschrift Hans R. Hahnloser* (Basel, 1961), pp. 223–250; H. R. Hahnloser, *Villard de Honnecourt* (Vienna, 1935).

[86] Otto Demus, *The Mosaics of Norman Sicily* (London, 1949), p. 445 ff.; D. J. A. Ross, "A Late Twelfth-century Artist's Pattern Sheet," *Journal of the Warburg and Courtauld Institutes*, 25 (1962), pp. 119–128.

[87] *Painting of the Life of St. Francis*, pp. 20–34.

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fresco, for greater rapidity; for having distributed the whole work over the base plaster, they would outline it with the brush, reproducing from a small design all that they wished to paint, and enlarging in proportion all that they thought to put down."[88] And apart from this passage Vasari refers to his own collection at the end of some of the Lives, informing us that he possessed drawings by Cimabue, Giotto, and others, although he does not state that these were studies for larger paintings. Eve Borsook assumes that small drawings, perhaps collected together in the form of model books, were used by Tuscan painters,[88a] since it is impossible to explain the copying of a mural, or even a cycle of murals, from one church onto the wall of another without supposing the existence of drawings from which the copying was done. Procacci also assumes that small drawings from studios were probably used although he rightly places more importance on the use of a *sinopia* or brush drawing, on the wall.[89]

As a forerunner of Byzantine brush sketches on the wall we have the examples of Dura, where the painters worked from the top of the painting downward, using charcoal or brush. That they composed their scenes on the wall itself is clear from the changes made in the drawings, and Kraeling leaves it as an open possiblity that they may have worked from small sketches.[90] Jerphanion mentions a church on the Boyalı river near Cemil where a red brush sketch had been revealed by the falling off of the upper layers of paint.[91] Feature lines, outlines, and the main lines of clothing were brushed in, and in each figure there was a vertical line down the middle to indicate the perpendicular and to give the figure an upright stance. At Direkli Kilise in the Ihlara valley there is a drawing on the west wall (fig. 10b.) which may be of Byzantine date, but it appears to be a sketch made for fun rather than a preliminary drawing for a wall painting.

In St. Sophia at Trebizond the flaking off of upper layers of paint revealed the preliminary red or yellow brush sketches in so many places as to suggest the presence of them for each scene, and numerous changes in the drawings indicated that the painter was composing his scenes on the wall[92] (figs. 7a–c, 8a, b.) In the Georgian church at Haho in northeastern Turkey part of a fine, red brush drawing of the Mother of God with the Christ Child survives on the northwest pier of the nave, where all except a few fragments of the final coloring has fallen off (figs. 3a–c, text fig. B), and I have visited numerous other Byzantine churches in which brush drawings can be seen wherever the upper

[88] *Le vite*, ed. G. Milanesi, 1, p. 558; trans. G. du C. de Vere (London, 1912–1914), 1, p. 173.

[88a] *The Mural Painters of Tuscany, from Cimabue to Andrea del Sarto* (London, 1960), p. 22.

[89] *Sinopie e affreschi* (Milan, 1961), pp. 13–14, note 6 on p. 46, where he quotes the Simone Martini passage. *Sinopia* is the Italian term generally used for brush sketches on the base plaster, or *arriccio* and the name derives from the town of Sinop on the Black Sea coast of Turkey, from which the best red earth was imported. However, many wall drawings were done in charcoal, or yellow ochre, or green earth, and they were made on the surface plaster, or *intonaco*, and even on bare walls. Therefore, I prefer to use the terms "brush sketch," or "brush drawing," or "preliminary drawing."

[90] *Op. cit.*, pp. 364–365.

[91] Guillaume de Jerphanion, *Une nouvelle province de l'art byzantin. Les églises rupestres de Cappadoce*, 1, pt. 1 (Paris, 1925), p. 65.

[92] David Talbot Rice, *The Church of Haghia Sophia at Trebizond* (Edinburgh, 1968), pp. 189–191, 202–205.

layers of paint have flaked off.[93] At Perachorio in Cyprus[94] the principal parts of the composition were sketched in red and ochre (figs. 4 a, b). It is clear from the changes of outline that the painter was modifying his drawings on the wall as he
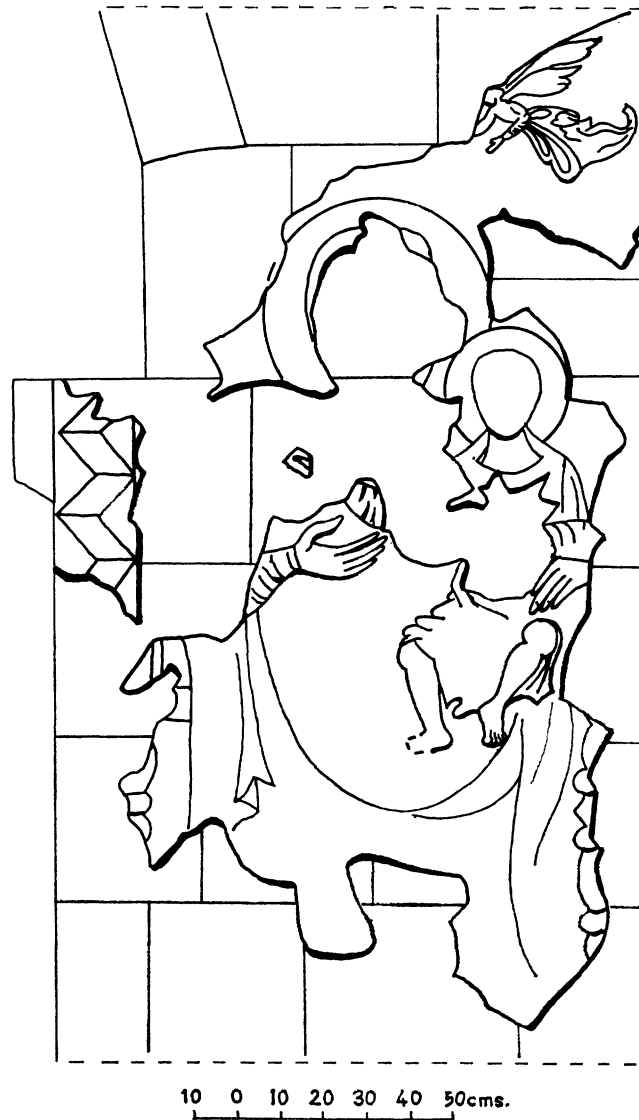
Fig. B.   Haho Cami, Northwest Pier under Dome,
South Face. Sketch showing Position of
Details in Figure 3

worked, and this and the general freedom of their style suggest that he was composing his scenes as he went along, rather than copying them from models. It may be further remarked that the painter could happily ignore his lively brush drawings as a guide, as can be seen from the heads of the Fathers in the

[93] The survival of these brush drawings when paint layers have flaked off is, as I have written above, fairly conclusive evidence that they were painted on the fresh plaster.

[94] Arthur H. S. Megaw and Ernest J. W. Hawkins, "The Church of the Holy Apostles at Perachorio, Cyprus, and Its Frescoes," *Dumbarton Oaks Papers*, 16 (1962), p. 284, figs. 13–15, 21, 22, 24–27, 38, 39.

apse, where the sketches are much too small and would have been useless in the final paintings (figs. 5 a, b). In the twelfth-, thirteenth-, and fourteenth-century paintings at Asinou in Cyprus the brush drawing in red can be seen in a few places (figs. 6, a, b.) and there is a fine preliminary brush drawing of the head of one of the Fathers in the apse at St. Nicholas tis Stegis at Kakopetria (fig. 8c). On the exterior of the west wall of the church of the Panagia Podithou in the village of Galata there are drawings, probably in charcoal, on either side of the door, of life-size-figures. These drawings, perhaps from the fifteenth century, were made directly upon the masonry, and must have been in the nature of full-length trial sketches for final figures.

Of Russian paintings, Dmitriev writes that yellow, brown, green, and other colors were used for a quick brush outline of the composition on the wall, and he notes that the painters often modified the sketch which they had made on the wall. The divergences were frequently considerable, and in illustration he cites a warrior saint from the Church of Our Savior of the Transfiguration at Nereditsa, where the position of an arm has been changed.[95] Blažić states that there are brush sketches in ochre for all Macedonian wall paintings, but he gives no details of them.[96] A fine example of a drawing on the lower layer of plaster at Dobrićevo, uncovered when the paintings were dismounted from the wall, shows a considerable change in the composition. This is, however, a late sixteenth- or early seventeenth-century example.[97] Finally, Didron gives us an eyewitness account of the work of the monk Joseph, who in less than one hour sketched out, freehand with the brush and without a model, an entire composition.[98]

An excursus into Byzantine wall decoration in mosaic reveals similar preliminary activities. Sometimes on the wall itself, as in S. Apollinare in Classe, but more often on one of the layers of plaster a rough brush sketch of the proposed composition was made, examples of which can be seen at S. Aquilinus in Milan. Then on the setting bed a fully colored picture was made on the fresh plaster to serve as a guide in setting the cubes. In S. Maria Maggiore at Ravenna there is a mosaic where the setting bed composition varies considerably from the first sketch, showing that changes in the composition took place on the wall.[99] At St. Luke's in Greece the setting bed painting is visible where mosaic cubes have fallen away from the wall.[100] The Deesis panel in St. Sophia in Istanbul was made with a rough outline brush sketch on the plaster below the setting bed followed by a full and careful painting of it in color on the setting bed.[101] The same two preliminary stages appear in S. Maria Maggiore. In Rus-

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[95] Iu. Dmitriev, *op. cit.*, p. 264, plate on p. 267.

[96] *Technique and Conservation of our Frescoes*, p. 20.

[97] Zdravko Kajmaković and Dušan Nonin, "The Translation of the Monastery of Dobrićevo," *Zograf*, 1 (1966), pp. 35–37.

[98] *Manuel*, p. 66.

[99] Guiseppe Bovini, "Notes techniques sur la préparation des mosaïques anciennes de Ravenne," *Les cahiers techniques de l'art*, 3, pt. 2 (Strasbourg, 1955), pp. 51–54.

[100] R. Oertel, "Wandmalerei und Zeichnungen in Italien ...," fig. 1, p. 217.

[101] Thomas Whittemore, "The Deesis Panel of the South Gallery," *The Mosaics of Haghia Sophia at Istanbul, Fourth Preliminary Report* (Oxford, 1952), p. 21.

sian mosaics the preliminary sketch was painted and colored on the setting bed, with an ochre background to imitate the mosaic gold.[102] Similar colored setting beds exist in a number of churches in Istanbul.[103] There are also setting bed paintings at Monreale, the Cappella Palatina, and in churches of Venice and Kiev.[104] In the mosaic of Cain and Abel from St. Mark's in Venice the mosaicist considerably altered the brush drawing when setting the tessellae.[105] All of these examples, together with the preliminary sketches for walls, provide proof enough that Byzantine painters usually made a full-scale outline on a wall space, in greater or lesser detail, of whatever composition was destined to cover that particular space.

While much remains to be discovered about the origins of wall-painting methods, it may be noted that the earliest form of them is simply a brush sketch This is followed by a stage where the outlines are filled in with flat washes of color, and it is only in a third stage that the brush sketch becomes a preliminary activity to painting and is covered by the final product. In the Thirty-fifth Book of his *Natural History* Pliny gives an account of the development of painting from drawing which, though fanciful, is not without instructive value, and he writes that it all began with tracing an outline around a man's shadow.[106] The third stage had been reached by Classical times, as in the Etruscan Tomba del lètto funebre where the preliminary sketch may have been in chalk, the outlines of which were afterward incised into the plaster.[107] In the Etruscan tombs at Corneto the walls were painted with an outline decoration in red, covered over when the colors were added. Lastly, the colored areas were outlined in black and the final outlines are often different from the preliminary red drawing.[108] At Boscotrecase the preliminary design is of two types. The more important details and objects with straight lines or of circular form are laid out with ruler and compasses and incised into the plaster, while the design elements are laid out freehand.[109] An unfinished wall painting from Pompeii shows the same type of brush drawing and incised lines as do the Boscotrecase paintings.[110] Eibner points out that the preliminary drawing had often to be done over the polished and colored surface of the plaster, hence the use of a lighter color for it.[111]

[102] Iu. Dmitriev, "Zametki po tekhnike russkikh stennykh rospisei X–XII VV," *op. cit.*, p. 277.

[103] P. Underwood, *The Kariye Djami*, 1, p. 174.

[104] E. Kitzinger, *op. cit.*, pp. 64–65.

[105] Ferdinando Forlati, "La tecnica dei primi mosaici marciani," *Arte veneta*, 3 (1949), pp. 85–87, figs. 82–83. For a mosaic drawing in Georgia: Georg Tschubinaschwili, *Die Kirche in Zromi und ihr Mosaik* (Tiflis, 1934), pl. 62.

[106] Ed. Rackham, 9, Bk. 35, chap. 5, p. 271 ff.

[107] Prentice Duell and Rutherford J. Gettens, "A Method of Painting in Classical Times," *Technical Studies in the Field of Fine Arts*, 9, no. 2 (October 1940), p. 93.

[108] Mary H. Swindler, *Ancient Painting, from the Earliest Times to the Period of Christian Art* (New Haven, 1929), p. 420.

[109] Peter H. von Blanckenhagen and Christina Alexander, *The Paintings from Boscotrecase, with an Appendix on Technique* by G. Papadopulos, Mitteilungen des Deutschen Archaeologischen Instituts. Roemische Abteilung (Heidelberg, 1962), p. 65. pl. 58, nos 1–3.

[110] L. Tintori and M. Meiss, "Additional Observations on Italian Mural Technique," *ArtB*, 46, pl. 1 facing p. 378.

[111] *Entwicklung und Werkstoffe der Wandmalerei*, pp. 273–276.

For brush sketches contemporary with Byzantine examples but from Western Europe, we have little material to go on, again not because the material is lacking but merely because of inadequate observation of the paintings. The sketches at Aachen have already been mentioned, some of them being in the nature of preliminary work while others were done for practice or amusement.[112]

Clemen remarks that in Rhenish Romanesque wall paintings the brush sketch is done freehand on the surface plaster and often corrected in the course of being sketched. He concludes that even before making the brush sketch on the surface plaster the painters may often have drawn an experimental rough outline in charcoal on the wall, as at Aachen, and he points out the similarity of this method of beginning a painting to that described by Cennini.[113]

Another example is at the chapel at Petersberg in the province of Carinthia, where a large composition of Mary on the throne of Solomon was first sketched in broad outlines on the base plaster and then in red and brown outlines on the surface plaster.[114] There are some preliminary drawings for a wall painting at Burgfelden which are very carefully done in a geometric framework, whereas, by contrast, the drawings of heads on the plaster of a wall at Corvey were obviously made for fun and are not part of a composition.[115]

A Gothic wall painting at the church of St. Michael at Zug, now exhibited in the Landesmuseum at Zurich, shows a large proportion of the preliminary drawing, since much of the final painting has flaked off. The drawing is in red and brown and a pinnacle of the architectural background shows where a change in scale has taken place after the drawing was done. The painting is of the Virgin between St. Barb and St. Joan and dates from 1466. In the same city there is a fine and carefully executed series of drawings for wall paintings in the crypt of the Cathedral.

Red or brown outline drawings are almost universal in the Romanesque wall paintings of Catalonia; they were made on the fresh plaster with pigments mixed in water.[116]

There are preliminary brush drawings in a number of Romanesque paintings in France, and it is thought that these were made on dry plaster which had been rewetted.[117] At Berzé-la-Ville the drawings were made on the surface plaster in red ochre, and the corrections visible in them make it quite clear that they were done freehand on the wall, not with a full scale cartoon.[118] There are examples of brush sketches in red at St. Gilles at Montoire in France, at Münster in Switzerland,[119] and also at Kempley in Gloucestershire.

The first post Antique examples of brush sketches in Italy are those of the Catacombs where some of the paintings were begun on the fresh plaster with a

[112] P. Clemen, *Romanische Monumentalmalerei*, p. 29, figs. 11–17.

[113] *Ibid.*, pp. 648–650.

[114] R. Oertel, *op. cit.*, pp. 279–280.

[115] Hubert Schrade, *Vor- und Frühromanische Malerei; die Karolingische, Ottonische, und Frühslavische Zeit* (Cologne, 1958), Burgfelden, pls. 98, 100, 101, Corvey, pl. 72.

[116] Ch. Kuhn, *Romanesque Mural Painting of Catalonia*, pp. 71–72.

[117] Paul-Henri Michel, *La fresque romane* (Paris, 1961), pp. 60–61.

[118] F. Mercier, *Les primitifs français*, p. 43.

[119] Ch. Kuhn, *op. cit.*, p. 73.

brush sketch.[120] Next we have Castelseprio where the distribution of scenes was marked out in incised lines on the base plaster, while the brush sketch for the individual composition was made on the fresh plaster surface. De Capitani d'Arzago remarks on the rapidity of the sketching and on the corrections made, and concludes that the painter worked out his composition on the wall, although he does not rule out the possible use of a model book. Similar red brush sketches where the upper layers of paint have fallen away can be seen also at S. Maria Antiqua in Rome.[121] A Roman wall painting, perhaps from the ninth century, in the Dumbarton Oaks Collection reveals, in places where upper layers of paint have flaked off, a green preliminary drawing for the head.[122]

Further examples are to be seen in the paintings of S. Angelo in Formis,[123] and on the exterior of the little church at Castel Appiano.[124] Oertel points out that, while the brush sketches for the mosaics were done on the setting bed, the brush sketches for wall paintings of the mediaeval period were commonly done on the surface plaster. Of the drawings for mosaics, he gives examples from S. Maria Maggiore of the early Christian period, by Torriti from the end of the thirteenth century, and examples from the cathedral at Salerno and the Baptistery at Florence. For wall paintings from the middle of the thirteenth century onward, he says that the system adopted was the one advocated by Cennini, that of a complete charcoal and brush drawing on the base plaster and the painting of small sections of surface plaster. He illustrates some drawings typical of this new method and discusses numerous examples, the examination of which is outside the scope of this paper.[125]

The existence of the earliest examples of relegating brush drawings to the base plaster can only be conjectured from the changing topography of plaster joins in the surface plaster. However, Procacci illustrates one thirteenth-century example from a wall painting in the cathedral at Pistoia, and one from a section of mosaic in the Baptistery at Florence.[126] The remainder of his great book on the subject is concerned with fourteenth- and fifteenth-century examples. The new system seems to have gained wide acceptance among wall painters from the thirteenth century onward, but the older and quicker method of drawing a composition on surface plaster does not seem to have died out. Tintori and Meiss give an interesting reconstruction of Giotto's method of laying out the geometrical design of the vault of the Arena Chapel which was made on the surface plaster.[127]

Procacci gives illustrations of freehand brush drawings on the surface plaster from the Bardi Chapel in Florence and from a work by Giovanni del Biondo in

[120] A. Eibner, *op. cit.*, pp. 330–332.

[121] A. de Capitani d'Arzago, G. Bognetti, and G. Chierici, *Santa Maria del Castelseprio*, pp. 626–627.

[122] Marvin C. Ross, *Catalogue of the Byzantine and Early Mediaeval Antiquities in the Dumbarton Oaks Collection*, I, *Metalwork, Ceramics, Glass, Glyptics, Painting* (Washington, D.C., 1962), No. 127, pp. 106–107, pl. LIX.

[123] Janine Wettstein, *Sant' Angelo in Formis* (Geneva, 1960), p. 52.

[124] Antonio Morassi, "Affreschi romanici di Castel Appiano," *Bollettino d'arte*, 6, 2nd Ser., no. 7 (April, 1927), p. 435.

[125] *Op. cit.*, p. 275 ff.

[126] *Sinopie e affreschi*, pls. 1 and 2.

[127] "Additional Observations," *op. cit.*, figs. 9–11.

S. Francesco di Castelfiorentino,[128] and numerous other examples in his larger work, although by no means are all the drawings of complete compositions.[129] Tintori and Borsook found no evidence of how the Peruzzi paintings were planned, but are of the opinion that small preliminary drawings on parchment or paper must have been made for the guidance of the assistants who carried out the painting. They remark that only one painting shows signs of a late change in the composition, and doubt if the scenes could have been composed directly on the wall. However, they quote Procacci as being of the opinion that this could have been done.[130]

Vasari gives us evidence of the continuation of brush sketches on the surface plaster in his Life of Spinello Aretino who, in Arezzo: "undertook to make for the Company of Saint Agnolo in that city certain stories of Saint Michael, which he sketched in red on the intonaco of the wall, in that rough fashion wherein the old craftsmen used generally to do it."[131]

If common sense were not in itself reason enough for supposing the existence of preliminary planning for a wall space destined to be covered with a number of paintings, we have seen in the previous section that a few actual examples of this procedure exist, and no doubt more examples will be found when the walls of churches are more closely inspected. This first stage, about which so little at the moment can be said, was a far greater problem for the painter than was the iconography or composition of his individual scenes. The difficulty of composing a scene has been much overemphasized, for iconography was largely a constant and unchanging aspect of the painter's work, whereas the shape and size of wall space into which he had to fit his compositions varied with each church.

The existence of full-scale preliminary drawings on the wall for individual compositions has been proved by the evidence given above, both from texts and by actual examples from the Byzantine Empire and from Western Europe. It is not, therefore, their existence which is in question, but their origin and the manner in which they were made.

A theory which concerns both of these points is that painters used full-scale cartoons in the form of tracings or cut-out models to transfer to the wall a painting which they had composed elsewhere. Kondakov was responsible for this explanation of the composing of Byzantine wall paintings, and a recent Soviet scholar continues to support it.[132] The same explanation is apparently still current for the composition of Romanesque wall paintings in France.[133] I know of no factual evidence to support this theory and there is much to be said against it. The mediaeval wall painter had to change the scale of his scenes in nearly every church he decorated. The only material which we know was available to him before the fourteenth century for making tracing paper

[128] U. Procacci, *La tecnica degli antichi affreschi*, pls. 7 and 8.

[129] *Idem, Sinopie e affreschi*, pp. 28–40, figs. 21–47.

[130] Leonetto Tintori and Eve Borsook, *Giotto: The Peruzzi Chapel* (New York, 1965), pp. 14–15, 22, p. 44 note 76 *bis*.

[131] *Le vite*, ed. Milanese, 1, p. 558; trans. De Vere, 1, p. 173.

[132] Nikodim P. Kondakov and Ivan I. Tolstoi, *Russkiĭa drevnosti v. pamiatnikakh iskusstva*, 6 (1899), p. 135; Shalva J. Amiranashvili, *History of Georgian Monumental Decorations* (Tiflis, 1957), 1, p. 24.

[133] P.-H. Michel, *op. cit.*, pp. 60–61.

was kid parchment, and the expense and trouble of preparing a sufficient number of such parchments for the composition of each of his wall paintings would have been prohibitive. Cennini gives instructions for the making of tracing paper, and both he and Dionysios of Fourna advise its use for tracing compositions from walls or panels.[134] Neither of them, however, mentions this practice except as part of a beginner's exercise in the art of painting. If cut-out models are thought to have been used, they must have been made of wood or some sort of cloth, and again the expense and the trouble of constructing a new set of models for each painting or of modifying old models would have been considerable. Furthermore, a study of the majority of surviving Byzantine and mediaeval wall drawings shows quite clearly that they were made freehand, and more evidence for this will be presented below in the section on incised guide lines. This notion that mediaeval craftsmen used full-scale cartoons or models for wall paintings or mosaics is a minor but classic example of the historian transferring ideas which belong to his own times into the period which he studies. The nineteenth-century academician was helpless without his careful studies and studio models for a painting or mosaic, and the nineteenth-century historian must have based his theory on observation of the practice of his artistic contemporaries.

The question of the manner in which wall drawings were made is less complex than a discussion of their origins, and may be tentatively dealt with by saying that Roman painters and their Byzantine and mediaeval successors made brush sketches of their compositions on the surface plaster as the initial step in the creation of a picture. That this stage may sometimes have been preceded by a drawing on the wall itself is suggested by the example at Aachen. Apparently, in the thirteenth century in Italy, but quite possibly following earlier precedents, a change in the topography of surface plaster joins in a number of wall paintings relegated the brush sketch to the base layer of plaster. However, the older practice of drawing on the surface plaster continued in use.

For mosaics there was sometimes a preliminary drawing on the second layer of plaster, and this was covered by setting bed plaster on which was painted a more detailed and fully colored picture of the mosaic; itself lost in turn as the cubes were set in place. Berger first pointed out the similarity of the mosaic preliminary sketch with the method of drawing a brush sketch on the base plaster as a preparation for wall paintings, since the mosaic sketch was fully painted on the fresh plaster and then covered bit by bit—as was the brush sketch on the base plaster of a painting—as the sections of surface plaster were built up in the new manner of creating a wall painting.[135] The theory of the influence of methods of constructing a mosaic on methods of wall painting is surely correct, since both arts were probably practiced by one and the same craftsman, but the analogy must not be pushed too far. One difference between

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[134] *The Craftsman's Handbook*, ed. and trans. D. V. Thompson, Jr., 1, chaps. 23–26, pp. 12–14; 2, pp. 13–14; M. Didron, *Manuel d'iconographie chrétienne*, pp. 14–19; A. Papadopoulos-Kerameus, ed., *Hermeneia tes zographikes technes*, pp. 7–10.

[135] *Fresko-, Oel- und Tempera-Malerei*, p. 103. His opinion has been accepted by Loumyer, Oertel, Thompson, and Tintori and Meiss.

the two arts is that the new wall-painting method demanded a brush drawing on dry base plaster; another is that it is not at all clear that mosaic was apportioned in daily patches of plaster from the top downard as was true of the new painting method. In the Fethiye Djami at Istanbul one mosaic figure, from the first half of the fourteenth century, is finished except for the hands and face, where the setting bed painting still shows.[136] This suggests that mosaicists may have followed the order practiced by Byzantine painters, who left the flesh and faces to be done last, as will be shown below.

In the apse of St. Sophia at Istanbul the figure of the Mother of God appears to have been set before the throne and footstool, but even if this was so, there seems to be no definite evidence that the faces and flesh were not left until later.[137]

The origin of the preliminary drawing on the wall brings us back to the question of small scale preparatory drawings or books of models, and the part, if any, that these played in helping the painter to make his full-scale wall drawing. Did he possess a sort of encyclopedia, with the iconography of all his scenes outlined for him, and/or a guide book with stylistic details, as well as perhaps a note book of his own such as most painters seem to keep for jotting down in graphic form the things that interest them.

For the existence of small preliminary drawings we have only references to the fact that the painter Parrhasius left drawings and that drawings on papyri or tablets are referred to in the Life of St. Pancratios, and the record of small drawings and painters' books from the two Russian sources. The Wolfenbüttel, Vatican, Freiburg, and British Museum manuscripts provide some evidence for the existence of painters' sketch books. For Italy, we have Vasari's description of Simone Martine using a sketch book just as the old masters had done,[138] the indirect evidence of Vasari's reference to his own collection of drawings by Giotto, Cimabue, and other old masters, and Cennini's lengthy instructions on drawing.

We do not know for certain why, except for practice, these drawings were made, but it is reasonable to assume that some of them were in the nature of preliminary work for larger paintings, or types of illustrated proposals for submission to a patron desiring wall decorations. However, a painting for this latter purpose must have been infrequently required of a Byzantine or mediaeval painter, unless the composition was of personal interest to the patron, as, for example, with a donation painting. Borsook assumes that small drawings did exist because of the copying and transmission of scenes, and concludes that Tuscan painters probably did have model books.[139]

At Aachen, at Corvey, in St. Sophia at Trebizond, and in several Italian examples we have brush sketches of studies on a small scale on the walls or plaster surfaces of churches, but there are no instances of whole compositions

[136] P. Underwood, *op. cit.*, p. 179.

[137] Cyril Mango and Ernest J. W. Hawkins, "The Apse Mosaics of St. Sophia at Istanbul. Report on Work Carried Out in 1964," *Dumbarton Oaks Papers*, 19 (1965), pp. 123–124.

[138] *Op. cit.*, 1, p. 692; trans. De Vere, 2, p. 38.

[139] *Mural Painters of Tuscany*, p. 22.

sketched in small scale on the wall or plaster. Together with these small studies of details we have definite evidence from the brush sketches in St. Sophia at Trebizond, in Our Savior of the Transfiguration at Nereditsa, and at Perachorio in Cyprus that the painters composed their scenes and altered them at the time they sketched them on the wall, and most of the other Byzantine and Romanesque wall drawings give an impression of freehand work. The frequency of alterations suggests that small studies were not used. If my analysis of the making of the Ascension painting in St. Sophia at Trebizond is correct, then it is virtually certain that there was no small drawing for it, since a drawing would have resolved previously the defects of the composition on the north side of the vault.[140]

However, on the other side of the question, as we have seen, common sense suggests that the painting, or the creation in mosaic, of a large composition, and indeed the general planning of a programme of scenes for a new church must have required some sort of preliminary small drawing, simply to overcome the organizational problems involved. And so to the question of whether, indeed such drawings existed, the best answer is perhaps the least exciting: sometimes a painter might have made one or more; sometimes, like the monk, Joseph, he might have made none. If they were made, such preliminary drawings might have been done in some impermanent form, in a sand or plaster tray or on a panel where they were constantly erased and redrawn, since economy would have prevented a lavish expenditure on parchment for a sketch which was only a means to an end, not a thing of value in itself.

The problem of the model book has been analyzed by Demus, who goes into the question of the spread of stylistic influences and the part played by model books, manuscripts, and the travels of artists.[141] He remarks that traditional practices survived for a long time in Byzantium and that for a tradition to die out was exceptional.[142] Kitzinger suggests two separate sources from which wall decorations might be compiled; these are pictorial guides which provided the iconography of scenes and motif books which provided the stylistic detail, since it is impossible to explain the appearance of figures nearly identical in style in different parts of a church without assuming some form of stylistic models. He also points out the importance of such books in the development of iconography, for the existence of them ensured continuity of tradition, while the variations caused by the compounding of different elements in them might cause variety and change.[143]

All of these must have played a part in the diffusion of style, but the lack of continuity which harasses the art historian need not be bridged by stretching the material links too far. Rather, it should be accepted that there must once have been much more continuity when thousands of manuscripts and churches

[140] D. Talbot Rice, *The Church of Haghia Sophia at Trebizond*, pp. 202–205.
[141] *The Mosaics of Norman Sicily*, p. 134ff., p. 443ff.
[142] *Ibid.*, p. 256.
[143] *The Mosaics of Monreale*, pp. 64–68; also *idem*, "Norman Sicily as a Source of Byzantine Influence on Western Art in the Twelfth Century," *Byzantine Art; an European Art* (Athens, 1966), for a further discussion of motif books.

existed all over the Christian world and when probably dozens of groups of painters were busy travelling and painting and transmitting a live craft and not a dead art. Good evidence for the existence of model books is provided by the letter about Theophanes quoted above (p. 83), and Dmitriev concludes that models must also have existed.[144]

Finally, we have the *Painters' Guide* of Dionysios of Fourna, the second part of which is an encyclopedia of iconographic information in descriptive, but not in pictorial, form. The existence of this *Guide* is not clear evidence for or against model books. It can be argued from the existence of the *Guide* that such things existed earlier, or it can be regarded as the typical product of some late and uncreative period of Byzantine painting when compiling and coding information was the best that the age could produce; or the *Guide* may be regarded as a late form of model book succeeding earlier ones made up of drawings. None of these speculations can be proved and all that we can note about the *Guide* at this stage is that the first section, containing for the most part receipts, but also instructions on how to paint, is based on a long tradition of receipt and instruction books.

The existence of some form of small pictures, which were made as guides for iconography, and of stylistic details in the form of sketches is accepted by most scholars, and it would be absurd to argue from the lack of any surviving work of this kind that there were none. It has been pointed out above that no value was placed on the craft of drawing in itself, and in-so-far as the Wolfenbüttel, Freiburg, Vatican, and British Museum manuscripts are evidence, it is clear that painters used their material as economically as possible. However, the importance of an organized and illustrated iconographic guide seems to me to be greatly overstressed and to present a practical difficulty which is at least worth stating, namely, that the size of such a book, if it were to cover more than just the Life of Christ and if the pictures were not on a minute scale, would be so great that it is hard to imagine each master painter or mosaicist being able to afford such a thing, or wishing to carry it around with him.

Nor does it seem to me necessarily true that stylistic detail requires some organized form of picture book for its transmission. This is not to say that painters did not occasionally sit down in churches, as Cennini suggests, and make drawings of a picture or of the configuration of garment folds on a figure or of some other detail which they liked, or that they did not sketch a note of an icon which attracted them or a manuscript illumination. Ricart has shown how widely some painters travelled in Romanesque Europe in search of work, and they would have been odd craftsmen indeed who showed no interest in unfamiliar works in their own line of business as they journeyed.[145] The Wolfenbüttel, Vatican, Freiburg, and British Museum manuscripts are clear examples of this sort of illustrated but disorganized memoranda for pictorial ideas, and the case of the Cotton Genesis and the mosaics of St. Mark's in Venice, if it is

[144] "Zametki po tekhnike," p. 265.

[145] José Gudiol Ricart, "Les peintres itinérants de l'époque romane," *Cahiers de civilisation médiévale*, 1, no. 2 (April—June 1958), pp. 191–194.

not founded in error, is an example of the use of manuscript illumination as a model for wall decoration.[146] But these were surely not the essential roots of the painter's work.

Iconographers have long held sway in discussions of the content and style of Byzantine wall paintings, and they have created for us painters after their own image, modelled somewhat in the fashion of pedantic scholars of the nineteenth century, dilligently searching out an ancient illumination or icon, then hastening to apply it to their wall, happy at last in painting a scene of respectable and high pedigree. Didron, among the earliest of the iconographers, gives us an unselfconcious report of the cultivated nineteenth-century scholar endeavoring to bridge the difference in outlook between himself and the monk Joseph, a mediaeval type of craftsman. He describes with accuracy and wonder how Joseph in one hour and without a model sketched on the wall his large composition of the Conversion of St. Paul. He notes the division of labor, facilitating speed, and the quality of the painting on which he spent five days, whereas a mediocre French painter might take six to eight months to achieve a less satisfactory result. Here is his final comment: "Je lui témoignai mon admiration; mais ma surprise l'étonna beaucoup lui-même, et il me répondit, avec ce que je croyais une rare modestie, que c'était bien simple et beaucoup moins extraordinaire que je ne le pensais. Puis il se remit tranquillement à l'oeuvre."[147]

Kitzinger has suggested the creative role of the painter in relation to "pictorial guides" and "motif books," since it would have been up to the painter to choose how to combine elements from each type of book.[148] I would go further than he does and stress that master painters were the essential, indeed, by far the most important factor in the evolution of iconography, for we do know that they existed by their works, even if we can only rarely attach a name to them.

The only written evidence that we have on the subject suggests precisely this, for Cennini writes that he will instruct us in the manner of painting of Giotto and devotes some care to telling us to choose a good master, and Dionysios of Fourna writes that he will teach us to paint after the manner of Panselinos, while neither of them tells us to acquire a good model book or to make a motif book, nor do they even mention such things. It matters not that they are writing long after the lives of their heroes, and that some of their instructions represent the practice of a later day and might have astonished those masters. What rings true is that each follows a master and describes a system, and surely the greatest source of transmission both for iconography and style was the living experience of years of apprenticeship and work on the walls of buildings.

In all likelihood, once a journeyman painter, a man remained always a painter and continued picture making until old age brought him to a stop, and

[146] J. J. Tikkanen, "Die Genesismosaiken von S. Marco in Venedig und ihr Verhältnis zu den Miniaturen der Cottonbibel," *Acta Societatis Scientiarum Fennicae*, 17 (1889), p. 99 ff.; Kurt Weitzmann, "Observations on the Cotton Genesis Fragments," in *Studies in Honor of A. M. Friend, Jr.* (Princeton, 1955), p. 119; O. Demus, "A Renascence of Early Christian Art in Thirteenth Century Venice," in *ibid.*, p. 348 ff.

[147] *Manuel*, Introduction, p. 18.

[148] *Monreale*, p. 63.

such a man would acquire at a mechanical level the iconographic and stylistic characteristics of his master. Having himself in turn become a master, he might—indeed he must—adapt his repertoire to suit the shape of the space he was painting, or compromise with the materials at his disposal, or accord with the wishes of a patron. But to suppose that he had always to go to a book for the disposition of his figures, for the curves of a garment, or for an architectural form is to introduce an unnecessary complication into the process of artistic creation.

We have assumed that in order to produce full-scale wall sketches, a painter sometimes made small drawings, but whether or not he actually did so would have depended upon the extent of his own capabilities and upon the size of the composition with which he was confronted. The evidence cited above is strong enough to make it certain that some form or forms of pictorial guide, which included iconographic information and perhaps stylistic details, were in use. We do not know whether they might have been of an organized character or whether they were private compilations of haphazard sketches on both subjects. The use of them would have depended upon the custom of an individual master painter, while the use of an illuminated manuscript model might have depended upon the wishes of a patron.

However, it must be emphasized once again that the painter was more important than the books. Bred, if not born, in his trade, he was at least a man of skill and proficiency, and while human categories cannot but be arbitrary, we may perhaps classify mediaeval and Byzantine painters into three types for the sake of summary clarity: The master of competence who lacked imagination would follow closely the style in which he had been trained, never innovating, and referring to some pictorial guide whenever possible; the master with competence allied to some imaginative power might alter small bits and pieces in the style of his former master or of what he derived from a pictorial guide; the master of competence possessed of that indefinable imaginative power which bridges the gap between craft and art would follow his former master for but a short while before beginning to experiment in changes of composition and stylistic detail, creating as he did so new ways of depicting old scenes, and relying little on the help of books or guides. Between the poles of slavish imitation and imaginative interpretation or creation all kinds of painters must have practiced their craft, some dependent on model books, sketch books, and preparatory drawings; some not so dependent. To attempt to be more specific on this subject would be to fall into the error of trimming facts to fit neat theories.

INCISED GUIDE LINES

As part of the preparation for painting a scene its main outlines were often incised into the plaster. The first of our written sources to mention this is Cennini, who writes: "If you wish to make a mantle for Our Lady with azurite, or any other drapery which you want to make solid blue, begin by laying in the

mantle or drapery in fresco with sinoper and black, the two parts sinoper, and the third black. But first scratch in the plan of the folds with some little pointed iron, or with a needle."[149]

This is the only passage in which Cennini mentions incising for a wall painting, and clearly the reason for it here is that when the base color of sinoper and black is laid on the preliminary drawing of the pattern of the folds will be lost. Our only other source is Dionysios of Fourna who, according to Didron, writes: "Travaillez de même le visage; vous en désignerez les contours avec un os taillé en pointe, et mettez la couleur de chair le plus promptement possible, avant la formation d'une croûte, ainsi que nous l'avons dit plus haut."[150] In the Papadopoulos-Kerameus text we find: "In the same fashion also polish the face and mark it with the trowel, or with a stone, or with a bone which you should have with you as if it were a knife. With this trace also the costume, proplasm the face, open it, and do the flesh. If you delay and it has set, do as we said above [i.e., strike it]."[151]

The evidence from the textbooks and the Table of Examples (*infra*, following p. 139) may end with a quotation from Mrs. Merrifield's collection, concerning the painter Caesare Baglione at Parma, where his fellow workers had begun work: "While he, laughing and sneering at these preparations of theirs, which he called impediments and annoyances, after playing his flute, boasted that he would begin to scratch the line at once with a nail without so many sketches and drawings."[152]

One major conclusion can be established as to the function of incised lines: they were a form of guide line which perpetuated the brush drawing otherwise lost beneath washes of color. All our authorities are agreed on this. Such lines appear in wall paintings of the Ancient World, are common in the middle and late Byzantine period, and if they appear to be of exceeding rarity in Romanesque wall paintings, I feel convinced that this is primarily because they simply have not been observed.

These guide lines may be in the form of freehand incision, or, as in some of the Italian examples, they may be the result of tracing a full-scale cartoon onto the wall. The freehand type of incision is described by Cennini in the passage quoted above, and its purpose is to perpetuate the brush drawing after it was covered up by the first over-all layers of color, so that the painter still had a guide for the shaping and placing of the elements in his composition. The reason the brush drawing disappeared under a wash of color is a matter which will be considered in the next section.

Freehand incision is normal in Byzantine wall paintings wherever I have been able to observe them, although it is not always present, as the Tables II–V (following plates) show, and the number of incised lines varies greatly even in a single church (figs. 11–17). For the sake of precision, haloes and other

[149] *Handbook*, ed. Thompson, 1, chap. 83, p. 53, 2, p. 54.
[150] *Manuel*, p. 58.
[151] *Hermeneia*, chap. 58, p. 39.
[152] M. Merrifield, *The Art of Fresco Painting*, p. 96. She is quoting a work by Malvasia; *Felsina Pittrice*, 1 (Bologna, 1678), p. 340.

circular forms were always laid out with some kind of compass, and the outlines of crosses on the surplices or stoles of bishops were frequently executed with a ruler. The incised version of the inscription around the Pantocrator in the dome of St. Sophia at Trebizond is good proof that the incision was freehand (figs. 13 a–c). The illustrations clearly show the quick and sketchy nature of the cuts, and it can be seen that the painter ignored the incised guide almost entirely when he painted in the letters.

There appears to be no certain evidence of the method of traced incisions from cartoons before the fifteenth century. Procacci illustrates a thirteenth-century painting with incised lines from Pistoia, but from the photo it would appear to be a normal example of freehand incision.[153] Borsook[154] and Tintori and Meiss[155] leave it as an open possibility that traced incisions may have been used earlier than the fifteenth century, but none of them advances any certain examples, whereas they do give examples of freehand incision.

Beyond the fact that incised lines served as guides, they might possibly have taken the place of the preliminary brush drawing in color if the painter was in a hurry or if he was a competent and assured worker, as in the case of Caesare Baglione. The competence of the master painter may also account for the varying amounts of incision in a single church; for instance, in St. Sophia at Trebizond, where the master may not have bothered with incised lines when working on his own, but put them in wherever assistants were to work.

We may reasonably infer a marked difference in temperament but none in general method of work in the painters of the Pantocrators of the domes of St. Demetrius at Peč and of St. Sophia at Trebizond. In the former a cautious and careful painter incised almost every small line of his composition before laying in his colors, while in the latter a bold painter dispensed with incision and set about his task undaunted by the monumental size of the figure. The work of a painter whose degree of self-confidence lay between these two extremes can be seen in the Pantocrator of the narthex at Asinou where a few general outlines for the features of the face and for the hair were incised, but none for the clothing (figs. 14–17). Father Joseph at Esphigmenou, if Didron is accurate, is another example of a painter confident enough to dispense with incised lines.

That in some cases the incisions were made in the wet plaster is proved by the ridges of displaced plaster on either side of the furrows in wall paintings at the Kariye Djami and at St. Andrew in the Treska gorges. In St. Sophia at Trebizond there are no ridges, but, considering the disturbance of the plaster, it seems likely that the incisions were made in the still fresh plaster, and Dmitriev and Blažić assume this to have been so in Russian and Macedonian examples. A modified and more sophisticated version of the incised guide line is to be found on the walls of the Church of St. Nicholas at Myra. In these paintings, perhaps of the twelfth century, the painter-plasterer used his trowel

[153] *Sinopie e affreschi*, p. 21, fig. III.
[154] *Op. cit.*, pp. 26, 33–34.
[155] *Painting of the Life of St. Francis*, pp. 11–13, pl. 5.

to mould the plaster to the shape of the painting he was to execute. There are examples in the north aisle where he impressed the folds of the garment of a standing saint and in the southern parecclesion where the wing feathers of an angel have been impressed. The same technique was apparently used in Cyprus at Lagoudera and at Agios Philon, Aphendrika, and must have required a very sure-handed craftsman.

Cennini thus mentions a type of freehand incision which, as we have seen, existed in wall paintings of the Ancient World, and which seems to have continued through the mediaeval period into the Renaissance. The method of traced incision was later described by Vasari, and it represents a more complex and careful process, no doubt derived from freehand incision, evident in paintings on many mediaeval walls, and in almost all early panel paintings.

THE COLORING OF WALL PAINTINGS

It is more than thirty years since Daniel V. Thompson wrote his great work, *The Materials of Medieval Painting*,[155a] yet even now few of those who write on the subject seem to have profited by it. The literature of the history of painting at its best has been notable for fine exposition and sentiment worthily expressed in eloquent prose, but it has been lacking in careful study of the materials and method by which a painting is made. This is an omission worthy of attention since these two particulars constitute the factual basis, or, as it were, the epigraphy of the subject. Because of lack of information no very detailed account of methods of coloring can be given.

ORDER FOR COLORING VARIOUS PARTS OF A PAINTING

Neither Pliny nor Vitruvius offers any help as to an order of procedure for painting a composition on a wall. Theophilus is the first to give some directions about it, but he is by no means clear on the subject. The order of the chapters in the first book of *De diversis artibus* would give us a start with the painting of the heads and then the clothing, followed by plain backgrounds, then by the rainbow sequence and background features such as buildings, trees, and rocks. This interpretation, however, has little to recommend it, and it does not seem improbable that Theophilus began with a discussion of the painting of a head because that was the most important thing in a picture, rather than because it was to be painted first.

Chapter fifteen is headed *De Mixtura vestimentorum in muro*, or, in manuscripts E and P, *Quomodo pingatur in muro*, and the first paragraph gives a brief instruction for the making of a yellow drapery and for making flesh color and the shadow color for flesh on a wall.[156] But in fact a small indication that plain backgrounds were the first thing to be painted is given in the second paragraph of the same chapter, the first part of which was discussed above in connection

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[155a] (New Haven, 1936).

[156] C. Dodwell, ed., *Theophilus: The Various Arts*, p. 13. For MS abbreviations, see p. lxxvii.

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with dry plaster. The paragraph begins, as was seen, with the opening moves for preparing to paint on a wall, and it continues with instructions for painting the background colors: *In campo sub lazure et viridi ponatur color qui dicitur veneda, mixtus ex nigro et calce, super quem, cum siccus fuerit, ponatur in suo loco lazur tenuis cum ovi mediolo abundanter aqua mixto temperatus, et super hunc iterum spissior propter decorem. Viride quoque misceatur cum suco et nigro.*[157] Blue over a blackish color for the upper background, and green over a blackish color for the lower background are by far the most common colors for the backgrounds of middle and late Byzantine wall paintings, and wherever I have observed them they were the first to be laid in. Since these are the first two colors that Theophilus mentions after writing that he will teach us how to paint on a wall, it is a reasonable hypothesis that he knew—or, if he did not, that the text which he had copied was emphatic on the point—that for wall painting the artist should begin with the background colors.

Following this comes chapter sixteen dealing with the band which presents the appearance of a rainbow, and this makes sense as an ideal example of the possible tones of color to use, combined with practical instructions in the method of painting one of these bands. Theophilus gives us twelve tones as the maximum possible for any one color, but descends also to more practical advice as to where to place the plain pigment when fewer than twelve tones are available. He then gives instructions for applying this system to architecture, thrones, trees, and mountains. All of these are background features in a composition, and it is therefore logical that they should come after the background colors described in chapter fifteen, since this is the order of painting to be found on Byzantine walls.[158]

In view of the problems which they present, all that can safely be said of the first sixteen chapters on painting is that they represent a confused general account of Byzantine and Western European painting practices, which in manuscript, on icon, and on wall conformed to much the same principles for the laying on of color. Professor Thompson's suggestion that Book One represents a garbled version of a Byzantine painter's manual is surely right,[159] and perhaps it might be further suggested that the source was Byzantium itself since chapters fourteen and sixteen show us an ideal palette with a range of color far in excess of average Byzantine or European practice both in basic pigments and in mixtures of those pigments.[160]

If, however, we allow the first sixteen chapters of Book One to stand as evidence for wall painting, Thompson's suggestion of a Greek origin is strength-

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[157] *Ibid.*, p. 13.

[158] *Ibid.*, pp. 14–16. It has been argued that chapters fourteen and sixteen concern painting in books, but the arguments are unconvincing. J. Hawthorne and C. Smith, *On Divers Arts. The Treatise of Theophilus*, Bk. 1, chap. 14, note 1, pp. 20–21, give the history of this controversy. See also Stephan Waetzoldt, "Systematisches Verzeichnis der Farbnamen," Münchner Jahrbuch der bildenden Kunst., Sar. 3, 3–4 (Munich, 1952–1953), pp. 150–158, and Heinz Roosen-Runge, "Die Buchmalereirezepte des Theophilus," *ibid.*, pp. 159–171.

[159] D. V. Thompson, in a review of W. Theobald's edition of Theophilus, *Speculum*, 10 (1935), p. 438.

[160] S. Waetzoldt, *op. cit.*, pp. 156–157, sets out these colors and color tones very conveniently in tabular form.

ened, since, as will be illustrated below, the instructions are representative of an order of painting which corresponds to middle and late Byzantine wall painting methods, providing only that we assume Theophilus treats first of the flesh and clothing of figures because they are spiritually the most important part of the picture.

Cennini, our next source, arranges his chapters on wall painting so that the first ones deal with faces and flesh, in much the same way as did Theophilus, but with the difference that Cennini's instructions are at once recognizable as the account of a practical painter. Chapters sixty-seven to seventy are on faces and flesh; Chapters seventy-one to seventy-four are on draperies—with the exception of seventy-two, which deals with painting a wall in *secco* and with what temperas to use; Chapters eighty-five to eighty-eight are on mountains, trees, foliage, plants, and buildings. This order is confirmed in a later passage giving instructions on how to paint a panel: "And it is true that the painting of the panel is carried out just as I taught you to work in fresco, except that you vary it in three respects. The first, that you always want to work on draperies and buildings before faces." And later: "When you have done the draperies, trees, buildings, and mountains, and got them painted, you must come to painting the faces...."[161]

Here, then, is a direct contradiction of the prevailing Byzantine order of work as it will be described below, but what is more difficult to understand is that it is also a direct contradiction of the method of working from the top of a painting downward when working in *fresco*, as at Assisi.[162] Were it not for the categorical assertion in the section on panels, I would assume that Cennini, with Theophilus, puts figures first because they are spiritually the raison d'être of a painting. However, this cannot be done since Cennini is quite clear and unambiguous on this particular order of painting, and he presents a problem of interpretation which those working on Italian wall paintings will have to solve.

The remarks of Dionysios of Fourna on the order of work for painting on a wall are frequently, and at some length, interrupted by his discussions of other subjects. He devotes eight (nine, in Didron) sections to the painting of faces and hair, and these have some parallel in Theophilus' chapters on the same subject, but it is not clear that they are concerned primarily with wall paintings or that they indicate that faces should be painted first. In the section on "How the Drawing must be done when Working on a Wall,"[163] he first explains how to measure and lay out the composition as a drawing and then recommends putting on a black color. Although he does not say where the black is to be put in, he may be referring here to putting in the black background undercoating in preparation for a top color, as was recommended by Theophilus. He goes on to instruct us to repolish the drapery areas and to put in the proplasmos or base color for them; then to repolish the area for the face and to incise its lines, and to add the shadow color as quickly as possible before the surface film

[161] *Handbook*, ed. Thompson, 1, pp. 87, 89, 2, pp. 91, 93.
[162] L. Tintori and M. Meiss, *Painting of the Life of St. Francis*, pp. 61–79.
[163] M. Didron, *Manuel*, p. 58; A. Papadopoulos-Kerameus, *Hermeneia*, chap. 58, pp. 38–39.

begins to form. Further, he advises incising the outlines of the draperies as was done for the face. There is no indication of when or how to paint the background features. Dionysios of Fourna, therefore, presents an order of painting which seems to begin with the background black and to continue to the garments of the figures, and then to the flesh.

Turning from the texts to wall paintings, we find that the order of painting in the Etruscan Tomba del lètto funebre seems to have been from red ochre outline drawing to yellow over-all background color; then over-all and undifferentiated color washes to fill in the areas within the outlines of the various figures or objects of the composition; finally, the main outlines were strengthened, and sometimes changed, with black.[164] Roman wall paintings seem to have been built up in much the same way. The colored backgrounds were done before any detailed work and were made on the fresh plaster, whereas the objects and figures portrayed are painted in some form of medium. Lehmann describes the sequence of painting as being from background to foreground, so that objects were portrayed before figures.[165]

Papadopulos' analysis of the Boscotrecase paintings shows that the backgrounds were painted before the design elements, but he gives no further details.[166] At Dura we find this order repeated: first the brush drawing, then the over-all background color, and then figures and objects, without specification of which came first.[167]

The paintings of the Kariye Djami are well preserved and evidence for the order of work is not therefore very often visible, but apparently the order was to put in the black of the background first, then the base color of the garments of figures, and finally the flesh colors.[168] In St. Sophia at Trebizond the wall paintings are so badly damaged that it is possible to reconstruct in more detail the stages by which a picture was brought to completion:[169] the brush drawing was followed by the laying on of the black background, then the base colors of the architecture and objects were put in, followed by haloes and garments of figures, and finally the flesh colors and inscriptions.

Wherever I have been able to observe the over and underlapping of layers of paint in other Byzantine churches this order of work has been adhered to. In particular there are details confirming it at Nerezi, at Asinou and Perachorio in Cyprus, at Eski Gümüş and at various churches in Cappadocia, and in other parts of Turkey. An example from the post-Byzantine period is found in the drum of the cupola of Ravanica in Serbia, where the flesh painting was done after that of the garments in the figure of one of the prophets; the figure wears a grey robe and sleeve, but the painter has forgotten to paint in the hand except in outline. The same sequence could be verified in fragments of fifteenth-, sixteenth-, and seventeenth-century paintings which were in the museum of

[164] P. Duell and R. Gettens, "A Method of Painting in Classical Times," *op. cit.*, p. 93.

[165] Phyllis W. Lehmann, *Roman Wall Paintings from Boscoreale in the Metropolitan Museum of Art* (Cambridge, Mass., 1953), pp. 164–165.

[166] In P. von Blanckenhagen and C. Alexander, *Paintings from Boscotrecase*, pp. 64–65.

[167] C. Kraeling, *The Synagogue. The Excavations at Dura-Europos*, p. 365.

[168] P. Underwood, *The Kariye Djami*, pp. 304–305.

[169] D. Talbot Rice, *op. cit.*, pp. 194–202.

Kuršumlu Han in Skoplje. Didron's account of Father Joseph verifies this order of work, except for the fact that the monk always used up a whole pot of color at once, and in doing so he may well have laid on the colors of both background objects and garments at the same time.

For paintings contemporary with our Byzantine examples no account seems to have been taken of the order in which the elements in a composition were painted, before the analysis of the paintings at Assisi, although where good photographs of damaged Romanesque paintings in Western Europe have been published, the layers of colors appear to conform with the Byzantine order of work. The careful and lucid account by Tintori and Meiss of the way The Miracle of the Spring was made shows nine sections of plaster, each assumed to represent successive operations, although finishing touches might have been added later throughout the picture.[170] The order of painting a roundel in the vault of the Peruzzi Chapel started with the face and hands, continued with the red mantle, and finished with the yellow book, which is painted on top of the mantle. The evidence for the face and hands having been done first appears to be based on the assumption that they were painted on the fresh plaster and are therefore well preserved, whereas the red mantle is not well preserved and must therefore have been painted afterward on the dry plaster. However, the heads in the vault ribs were painted when the plaster was almost dry.[171] The same conclusive evidence of overlapping paint layers is lacking here, but in the Birth of the Baptist the red of a bodice runs over the forearm of its wearer, showing that the forearm was painted first. Thus, the Peruzzi Chapel appears to accord with Cennini's recommended order of painting. In the Annunciation to Zacharias the architecture was drawn in first, then Zacharias and the other figures were painted in before the architecture was finished; this is evident where the folds of a gown have been laid in and then a column painted on top of them.[172] In practice the work ran more or less from the top of the picture downward, so that the plain upper background and background features were painted first, then the heads of the figures, followed by the bodies, and, finally, the foreground rocks.

In summary, we have a Classical and Roman order of painting which appears to run from the monochrome background to elements in the foreground, with the whole background colored in before figures or objects were painted.[173] However, more than one style of painting was practiced by the Romans, and the painting from the Villa dei Misteri seems to show an order of work from the top downward, with the vertical divisions conforming more or less to the shapes of the figures, and in only two cases are the heads separated from the bodies of the figures.[174]

The Byzantine order of painting runs from the usually monochrome back and foregrounds to the background objects, then to the clothing of the figures—

[170] *Painting of the Life of St. Francis*, pp. 61–79.
[171] L. Tintori and E. Borsook, *Giotto: The Peruzzi Chapel*, pp. 15–59.
[172] *Ibid.*, pp. 84, 85.
[173] P. Lehmann, *op. cit.*, p. 165.
[174] L. Tintori and M. Meiss, *Painting of the Life of St. Francis*, pp. 4–5, figs. 1l, 1r.

though objects and clothing may at times be contemporaneous—and finally to the faces and the flesh of figures, and trimmings, such as inscriptions. The Italian order of work, where the system of small areas of surface plaster is employed, runs more or less from the top downward, which in effect means, first, background and background objects, second, heads of figures singly or in groups or occasionally whole figures, third, the bodies, and, finally, the foreground. Where the larger plaster joins are employed, no consecutive account of the build-up of a composition seems to have been attempted as yet. All of these systems seem to share a rough and ready general principle of working from the top to the bottom of the painting, except that in Byzantine painting the plain foregrounds as well as the backgrounds—at least their base coloring—were put in first and the faces and flesh of figures were always the last parts to be completed (figs. 18b, 22).

MEDIA FOR PIGMENTS

Throughout this section I use the word "medium," although it will be seen that Cennini uses "tempera." I have made this choice because "medium" is a general word, descriptive of any substance or liquid in which pigments are applied to the ground to be painted, whereas "tempera" is understood by some authors to denote the specific medium egg, and can therefore be misleading.

Regarding the medium in which pigments were applied to walls, it can be assumed from what we have seen above that Pliny and Vitruvius both knew of painting on fresh plaster with pigments mixed in water.[175] Beyond this Vitruvius mentions that Punic wax was mixed with oil as a protection for vermilion against sun or moonlight; black may be mixed with gum for use as ink and with glue for use on walls; Tyrian purple may be mixed with honey to keep it liquid; another purple and a substitute indigo are used on chalk bases in the form of lakes; and whortleberry purple may be mixed with milk.[176]

Thus, as specific media for walls, Vitruvius gives water and glue, while of other media he mentions gum, honey, and milk.

Pliny's list adds encaustic painting which is done with wax,[177] but he states that this is "a sort of process which cannot be applied to walls." He mentions a purple color to be mixed with egg,[178] and a white earth to be mixed with milk.[179]

The sources for the Ancient World therefore give us water, gum, glue, honey, egg, and milk as possible media for applying colors to a wall.

Our mediaeval sources begin with the Lucca Manuscript and the *Mappae Clavicula* which, in passages quoted above, refer to painting on walls in water,

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[175] Vitruvius, *On Architecture*, ed. and trans. F. Granger (Loeb), 2, Bk. 7, chap. 3, pp. 92–95. Pliny, *Natural History*, ed. and trans. H. Rackham (Loeb), 9, Bk. 33, chap. 56, pp. 118–119; Bk. 35, chap. 31, pp. 296–299.

[176] *Ibid.*, chaps. 9–14, pp. 118–129.

[177] *Ibid.*, Bk. 35, chap. 31, pp. 296–299; chaps. 39–40, pp. 350–357; chap. 41, pp. 370–371. His remark about the encaustic method is innacurate, since there is a Byzantine example of an encaustic wall painting in the monastery church of Mount Sinai. For knowledge of this, I am indebted to Mr. E. J. W. Hawkins, Research Associate in Byzantine Archaeology at Dumbarton Oaks.

[178] *Ibid.*, chap. 26, pp. 294–295.

[179] *Ibid.*, chap. 52, pp. 402–405.

on wood in wax, and on hides or on wood in fish glue, so that the list is reduced to one specific medium for walls.[180] For a color like cinnabar the *Mappae Clavicula* instructs us to use a mixture of sinoper and Syrian red in water,[181] and both manuscripts list gum, oils, glue, white of egg, resins, saponified oil, turpentine, and casein in various contexts so that it is clear that a good variety of media were known, some of which could have been used on walls.

In the Phillipps manuscript of the *Mappae Clavicula*, which is a twelfth-century version, there are some introductory passages not present in earlier copies, and these add to the previous list of media: A. 10, *temperatura*[182] gives a green with *acetum* as a medium, which must almost certainly be wine vinegar; and A. 11 gives *calcea*, which may be chalk or lime, as a medium for *folium*.[183] The meaning of *calcea* is dicussed below.

Mercier quotes some of the media referred to in the two manuscripts, with incorrect chapter references, and adds the juice of pears to the list, though there appears to be nothing in the *Mappae Clavicula* manuscript to warrant this.[184]

Another twelfth-century manuscript, *De coloribus et artibus Romanorum*, by Heraclius, repeats the list of media mentioned above with a little more information. This is put together in Book Three in a chapter headed *De pratica generali in movendo omnes colores*. It reads: *Sciendum autem est quod omnes colores cum aqua clara moli possunt, si postea exsiccari permittantur, ut postea glarea, vel oleum, vel aqua gummata, aut acetum, seu vinum, necnon cervesia, quomodo misceantur aut temperentur.*[185] Chapter two of Book One, which is in verse, also mentions lime as a medium for a green color. Chapter twenty-nine mentions a mixture of lime and oil for use as a medium; chapter thirty-two mentions white of egg as a medium for orpiment; chapter thirty-seven prescribes vinegar or very good wine as a medium for terre-verte when used on walls; chapter forty specifically mentions that for painting on walls or wood orpiment should be mixed with the whole egg; and Chapter fifty-two has *calx ex duro saxa facta* as a medium for *folium*.[186]

Our next text is Theophilus' *De diversis artibus*, where in chapter sixteen *calcea* is given as the medium for all colors to be used on a wall. The meaning of this word is of some importance since it appears in all four of our manuscripts,

[180] J. Burnam, *A Classical Technology*, text p. 46, trans. p. 109; H. Hedfors, *Compositiones ad tingenda musiva*, text, p. 33, trans., pp. 153–154; Thos. Philipps, "Mappae Clavicula," *Archaeologia*, 32, chap. 192, p. 224.

[181] Thos. Phillipps, *ibid.*, chap. 243, p. 233.

[182] R. Johnson, "Some Manuscripts of the *Mappae Clavicula*," *Speculum*, 10, pp. 72–81. I follow her numbering.

[183] Thos. Philipps, *op. cit.*, pp. 188–189. On *folium*, see D. V. Thompson, *Materials of Medieval Painting*, chap. 3, pp. 126, 141–144, 158, 159. On binding media, chap. 2, pp. 42–73.

[184] *Les primitifs français*, p. 75.

[185] Ed. and trans. Albert Ilg, in *Quellenschriften für Kunstgeschichte und Kunsttechnik des Mittelalters und der Renaissance*, 4 (Vienna, 1873), Bk. 3, chap. 28, p. 75. For a commentary on Heraclius' manuscripts, see J. C. Richards, "A New Manuscript of Heraclius," *Speculum*, 15, no. 3 (July 1940), pp. 255–271, and for a commentary on the date and contents of Book Three, see E. Berger, *Fresko-, Oel-*, 2, pp. 30–40.

[186] Heraclius, *ibid.*, Bk. 1, chap. 2, p. 5; Bk. 3, chaps. 29, 32, p. 75, chap. 40, p. 81, chap. 37, p. 79, chap. 52, p. 89.

but the dictionaries unfortunately give both "lime" and "chalk" as translations.[187] The important difference is that lime would be a medium acting as a fixative for the pigments conveyed in it, whereas chalk would form an inert medium which merely added body to the pigments. Of the most recent translators, one renders it as "lime,"[188] while the other uses "lime" in one context and "chalk-white" in another.[189] Lime would certainly have been the most practical medium, and the lasting quality of many Romanesque and Byzantine wall paintings suggest that it was indeed lime that was used, and that this is the proper translation.

In Chapter thirty-three Theophilus gives quick-lime 'in a receipt for red *folium* in a context where it is not entirely clear whether we are to regard lime as an ingredient of the color, or as a medium, or possibly as both. Water is given as a medium in chapter two, and perhaps in chapter fifteen, as we have seen above, and again in chapter twenty-four where there is a reference to an earlier mention of other colors which were mixed with water for faces and robes. It may be that lime water was used instead of plain water, although the texts say nothing of this. The only medium specifically mentioned for walls is the yolk of egg for use with azurite and green, and it should be mixed, writes Theophilus, with plenty of water. For other purposes he mentions white of egg, gum, glue, a resin, and linseed oil, and there is the possibility that the pigments made from vegetable juices such as *sucus* and *folium* might of themselves act as binding agents.[190] Chapters three and seven are about a color called *Posc*. The derivation of this is unclear according to Waetzoldt,[191] and the English translators render it as "shadow." Lewis and Short define *posca* as "an acidulous drink of vinegar and water," and there is surely no difficulty here, since vinegar is known as an ingredient in receipts for pigments and as a medium from other mediaeval sources, and it seems probable that a composite color requiring a vinegar and water medium finally took on the name of the medium itself. Roosen-Runge gives white of egg as a medium for these two shadow colors,[192] and, if he is correct, perhaps the vinegar and water were added as diluents or preservatives.[193]

Following Theophilus we have a thirteenth- or fourteenth-century manuscript from Erfurt, *De coloribus naturalia exscripta et collecta*,[194] of which paragraph twenty reads: "This is the way to temper all colors; Spanish green with gum; vermilion with glair; brazil with glair poured over it; and a little alum added; blue with glair or gum. Boil gum arabic up with water, and add a little vellum

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[187] C. Lewis and C. Short, *Latin Dictionary*, give *calcis* as limestone or lime whether slaked or unslaked, while J. Baxter and C. Johnson, *Medieval Latin Word-list* ..., give it as meaning chalk or lime.

[188] J. Hawthorne and C. Smith, *op. cit.*, chap. 15, p. 23.

[189] Ed. Dodwell, *op. cit.*, Bk. 1, chap. xv, p. 13, chap. xvi, p. 16. I give chapter references hereafter in the text, since Book One is very short and to avoid proliferation of footnotes.

[190] J. Hawthorne and C. Smith, *op. cit.*, chap. 25, note 1, pp. 32–33.

[191] "Systematisches," *op. cit.*, pp. 154–155.

[192] "Buchmalereirezepte," *op. cit.*, p. 163. For a general commentary on Theophilus on painting, see E. Berger, *op. cit.*, pp. 41–54.

[193] D. Thompson, *Materials of Medieval Painting*, pp. 55, 64.

[194] Ed. D. V. Thompson, in *Technical Studies*, 3, no. 3 (January 1935), pp. 144–145.

parchment, and it will be tempered with it; and that is good for all mixtures, even for blue."

Cennini gives lime white—he calls it *bianco San Giovanni*—as the main medium for painting on a fresh wall. In chapter fifty-eight he tells us how to prepare it and concludes his instructions with: "And it is good for working in fresco, that is, on a wall without any tempera; and without this you cannot accomplish anything in the way of flesh color and other mixtures of the other colors which you make for a wall, that is, for fresco; and it never wants any tempera whatever."[195] It was prepared in little cakes and dried in the sun, which must have formed a partially carbonated mixture of lime and chalk.[196] The other media described by Cennini as applicable to walls are found in chapter sixty where he mentions size in connection with azurite, and in chapter seventy-two where he speaks of egg in its whole form or of using only the yolk. In particular he recommends the preparation of any dry ground for painting by sponging over it a weak solution of whole egg diluted in water. Chapters eighty-nine to ninety-three give instructions for painting on a wall with an oil medium, and a later section on the painting of water shows that Cennini was aware of the value of oil as a medium conveying the impression of transparency. He is quite clear in his instructions on the difference between *fresco* and *secco* and the media to be used for them, and makes this important statement in chapter seventy-seven: "And know that everything which you execute in fresco needs to be brought to completion, and touched up, in secco with tempera." In chapter eighty-six he gives instructions for the painting of trees, which it is clear are to be done wholly on dry plaster: ". . . first lay in the trunk of the tree with pure black, tempered, for they can hardly be done in fresco. . . ." These are pronouncements to which the protagonists of *fresco* painting might usefully devote some attention.

Our next text is the *Painters' Guide* where again we find lime white as the binding medium for painting on walls, but the author does not appear to be aware of the binding properties of lime since, if it is not available, he recommends the use of old plaster well ground up, which would give a good color but form an entirely inert medium.[197] Dionysios of Fourna devotes two paragraphs to a discussion of azurite; in one he recommends using azurite mixed with indigo and lime white, which would be satisfactory providing the white were made of old plaster; in the other he recommends a glue of boiled bran as a medium and points out that the wall must be dry.[198] For other purposes he mentions glue, gum, oil, resin, whole egg, white of egg, honey, wax, garlic juice, snail saliva, vinegar, and alcohol, some of which may have been used as media on walls. For the black preliminary drawing of feature lines he recommends the medium ὀξύ which Didron leaves untranslated. This might mean either acid or vinegar, and the *Guide* later recommends it for erasing mistakes.[199]

[195] *Handbook*, ed. Thompson, 1, chap. 58, pp. 32–33, 2, p. 34.
[196] Arthur P. Laurie, *The Painter's Methods and Materials* (Philadelphia, 1926), p. 198.
[197] A. Papadopoulos-Kerameus, *Hermeneia*, chap. 59, p. 39; M. Didron, *Manuel*, pp. 58–59.
[198] A. Papadopoulos-Kerameus, *op. cit.*, chaps. 65, 68, pp. 40–42; M. Didron, *op. cit.*, pp. 60–62.
[199] A. Papadopoulos-Kerameus, *op. cit.*, chap. 17; p. 20; M. Didron, *op. cit.*, p. 34.

Four separate Russian painters' manuals of the sixteenth century advocate painting on fresh plaster with water, but with some exceptions; in one manual, azurite, and cinnabar have a glue medium; in another a wheat glue medium; in a third a flax glue medium; and in a fourth manual white of egg or sweet honey are recommended for use as media if the plaster is dry. Dmitriev comments that the first three manuals may be taken as representative of the practice of eleventh- and twelfth-century painters and that the practice of finishing a painting on dry plaster, using colors with a binding medium, had begun comparatively late.[200]

Finally, the Strasbourg manuscript on colors, which is a fourteenth-century work, presents a medium for walls and panels which the writer states is Greek.[201] The ingredients are lime, glue made from parchment (skins), and vinegar. He says that it will keep for a long time and that to ready it for use water and honey should be added to achieve the desired consistency.

Laboratory analyses of wall paintings have not been done very frequently, and when they have been, information as to the medium employed in them has not been conclusive. Chemical change, by drying or by water seepage, and mould growths are among the factors which make for uncertainty, so that, on the question of the medium employed, the results of analysis tend to be reduced to a statement that a certain amount of organic matter was found in the sample under examination. We have seen that water and lime are either mentioned or implied in all our sources, and these were probably employed constantly from the time that lime plaster was first used as a ground for painting.

The paintings of the Tomba del lètto funebre were probably done in a water or tempera medium.[202] In addition to their own analyses, Duell and Gettens carried out a careful sifting of the evidence available about Cretan wall paintings, and concluded that separate paint films indicate that a medium was used, but they were unable to identify it.[203]

In the Boscotrecase paintings the colored backgrounds were done in a water medium, and the same was probably true of the design elements, although the medium for these may have been lime water.[204] In the samples from St. Médard des Prés there were layers of paint, and lime appears to have been the medium employed.[205] In an experimental washing of some of the wall paintings at Herculaneum the design elements came off while the colored background remained intact, which suggests that some organic medium was used there.[206] It would take too much space to sift here all the evidence and arguments used over methods of painting in classical times, and the above examples must suffice to

[200] "Zametki po tekhnike russkikh stennykh rospisei X–XII VV," op. cit., pp. 258–261.

[201] E. Berger, Fresko-, Oel- und Tempera-Malerei, p. 169. Berger publishes the complete text of the manuscript and includes a full discussion of it.

[202] P. Duell and R. Gettens, "A Method of Painting in Classical Times", Technical Studies in the Field of Fine Arts, 9, no. 2, p. 104.

[203] "A Review of the Problem of Aegean Wall Painting," op. cit., 10, no. 4 (April 1942), pp. 198–223, esp. pp. 221–223.

[204] P. von Blanckenhagen and C. Alexander, Paintings from Boscotrecase, with Appendix by G. Papadopulos, pp. 64–65.

[205] A. Laurie, Greek and Roman Methods of Painting, pp. 101–103.

[206] Idem, Materials of the Painter's Craft, p. 111. He quotes Winckelmann's evidence.

suggest that water, lime, and organic mediums of some sort were employed for wall paintings. Just which medium was employed in a particular instance might have been partly the result of the method in which a painter had been trained and partly dependent upon the nature of the pigment he was using.

The difficulty of being much more precise about Byzantine examples is due to the reasons already given above. Dura is a typical example in this respect, and authors writing of its wall paintings suggest that a medium of gum or egg white may have been used for them.[207] Blažić states that lime and water were the media used for Macedonian wall paintings.[208] Dmitriev writes that Russian wall paintings were executed in a water medium on fresh plaster, and he maintains that the white pigment for walls consisted of carbonate of lime. He points out that this has no binding properties, which, he says, explains why white always flakes off before other colors.[209] This statement must be accepted with some reserve, since, if a live lime white was used it would have carbonated over the centuries, and whether it was used in a carbonated form when applied to the wall is not so easy to determine. Furthermore, observation of Byzantine wall paintings does not reveal that the white colors were always the first to flake off. They are, on the contrary, usually solid even though they are the topmost pigment, and in the church of Haho in the former Georgian province of Tao, white high lights and the red preliminary drawing are the only surviving colors (figs. 3 a–c). Dmitriev also notes that the thickness of the color layers varies from church to church, and even in different parts of the same church.

Underwood, writing of the background black of the paintings in the Kariye Djami, states that it is thin and gives the appearance of having been applied in a water medium.[210] He found that it was impossible to determine what, if any, organic binders were employed; this same difficulty appeared too in the analyses of the paintings of St. Sophia at Trebizond.[211] Exceptionally, Belting mentions the identification of casein and lime as a binding medium used in the painting of St. Euphemia at Istanbul.[212]

Observation of Byzantine wall paintings throughout Turkey, the Balkans, and Cyprus confirms that the dark colors are thin and the light colors thick, from which we may deduce that a powder white was extensively used to lighten the basic colors (figs. 12 a, 15–25, 28). Whether this was a lime white or a chalk white is a matter for speculation, and the fact that Dionysios of Fourna mentions both is not helpful. There may or may not have been additions to the white to help in binding it more effectively, as is suggested in the Strasbourg receipt. But the fact that so many Byzantine wall paintings have survived a great deal of rough treatment and exposure to the weather suggests strongly that the white was often a lime white which acted as a binding medium. The dark colors, which in general have little or no thickness, must have been

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[207] C. Kraeling, *The Synagogue. Excavations at Dura-Europos*, p. 364.
[208] *Technique and Conservation of Our Frescoes*, pp. 16–17.
[209] *Op. cit.*, p. 257.
[210] *The Kariye Djami*, I, p. 304.
[211] D. Talbot Rice, *The Church of Haghia Sophia at Trebizond*, chap. 10, p. 228.
[212] Rudolf Naumann and Hans Belting, *Die Euphemia-Kirche am Hippodrom zu Istanbul und ihre Fresken*, Istanbuler Forschungen, 25 (Berlin, 1966), p. 117.

applied in a watery medium, which might have been lime water. Where a coating of blue or green is laid over the black base color of back and foreground a glue or egg medium is likely to have been used, and the decay of this is responsible for the dark coloring of many Byzantine backgrounds. The powdering away of the blues and greens has not been sufficiently noted in writings on Byzantine wall paintings, and this omission has led to some poetic but inaccurate passages about the mysterious depth and gloomy profundity of Byzantine backgrounds. A fine example of what blue and green backgrounds should look like can be seen on the walls of St. Clement at Ohrid where they, and indeed nearly all the colors, arrest attention by the amount of original sharp brilliance which has survived. A full account of the pigments, media, and methods used there by Michael and Eutychios would be of great interest and value, for the paintings were made in the last decade of the thirteenth century and are contemporary with a time of changing methods in Italy.

Turning from Byzantine examples to contemporary work in the West, we are faced with the customary lack of pre-twelfth-century examples. Eibner quotes Schultze as saying that in the Catacombs he found both lime painting in *fresco* and tempera painting. Eibner considers them all to be lime painting, but remarks that further analysis is needed to learn what media were used, an observation that is still true forty years after it was made.[213] In the wall painting fragment at Dumbarton Oaks (*supra*, p. 89), there is a green preliminary drawing which is very thin—and which was probably on the fresh plaster—and thin layers of paint above, indicating the use of a medium.[214]

It appears from the thickness of the paint layers at Castelseprio that lime white was used, while for the first colors, as we have seen above, water was used on the fresh plaster. This same color layer system is to be seen at Pompei, in the fifth- to seventh-century paintings of the Syrian, Palestinian, and Alexandrian regions, and at S. Maria Antiqua.[215]

Romanesque paintings in the west of France were painted in a lime medium on a dry wall. The crypts at Auxerre and Berzé-la-Ville are examples of *fresco* painting proper, and St. Savin is an example where a glue medium was used.[216] At Berzé-la-Ville, glue and wax were isolated as the two media used on the walls, and Mercier gives a careful analysis of the uses to which the painter put them, that is, glue for the matt colors and wax for the glossy colors.[217]

In Spain the Romanesque paintings of Catalonia were begun with a water medium on the fresh plaster and continued with milk of lime or lime white as the medium while the wall dried. One exception to this were the paintings in the Church of San Miguel de la Seo de Urgel which were done entirely on the fresh plaster.[218] The Rhenish Romanesque paintings also appear to have been begun

[213] *Entwicklung und Werkstoffe der Wandmalerei*, pp. 331–332.
[214] M. Ross, *Catalogue of the Byzantine and Early Mediaeval Antiquities in the Dumbarton Oaks Collection*, I, No. 127, pp. 106–107, pl. LIX.
[215] A. de Capitani d'Arzago, G. Bognetti, and G. Chierici, *Santa Maria del Castelseprio*, pp. 627–628.
[216] P.-H. Michel, *La fresque romane*, pp. 56–61.
[217] *Les primitifs français*, pp. 75–77.
[218] Ch. Kuhn, *Romanesque Mural Painting of Catalonia*, pp. 70–71.

on the fresh plaster and to have been carried on with lime water or lime white as a binding medium.[219]

The paintings of S. Angelo in Formis were begun on the fresh plaster but continued in tempera, and, though the layers can be clearly seen, the tempera used has not been specified.[220] In the crypt of Aquileia the paint is in layers, and lime and water were almost certainly used as media there, although they may not have been the only ones; whereas in the Baptistery of Concordia Sagittaria the paintings show no visible signs of layering and must have been painted rapidly in a water medium on the wet plaster.

Tintori and Meiss make the general remark that the medium changed according to whether the surface plaster is divided into *giornata* or *pontata*, and they equate the former with painting on fresh plaster and the latter with painting on dry plaster, an assumption which will be examined further below. They note that lime paste is a medium for painting on dry plaster, and that Cennini recommends an egg medium. They subscribe to the popular assumption that Cennini had a positive horror of painting after the plaster had dried out, although, as mentioned above, he states quite clearly that work begun in *fresco* must be finished in tempera. To read into Cennini's text anything more than a firm reiteration that a painting must be begun on fresh plaster and that as much of it as possible must be completed on fresh plaster is to find in his works a meaning which is not there and to attribute to him an almost moralistic approach to *fresco* painting such as was displayed by Vasari—but not by Cennini.

Tintori and Meiss, while not specific about the medium for fresh plaster, do speak of layers of paint where work was carried to conclusion on dry plaster.[221] Borsook suggests that on dry plaster lime, rabbit skin glue, yolk of egg, or plant sap might have been used, but she gives no actual examples.[222] In the Peruzzi' Chapel water was used as a medium and its use on dry plaster accounts for the bad condition of the paintings, but Tintori also suggests fig milk or cherry tree resin as possible binders.[223]

Any conclusion as to the media employed by the Byzantines for wall paintings must remain conjectural for the present, but it is clear from the texts that water, lime, and various organic media have been known and used for paintings since ancient times. Whereas the analysts give us little more than uncertainty, the texts at least name media for us, and from Pliny onward the list grows, making it clear that both classical and mediaeval authors were aware of, and very interested in, the properties of different colors and the different media which they required.

Thus, we can establish perhaps one useful conclusion to act in the nature of a guide: to designate one medium for exclusive use in one period or style of wall painting is dangerous, since some colors must be used only on a dry wall

[219] P. Clemen, *Romanische Monumentalmalerei*, pp. 645–648.
[220] J. Wettstein, *Sant' Angelo in Formis*, p. 52.
[221] *Painting of the Life of St. Francis*, pp. 62–78.
[222] *Mural Painters of Tuscany*, p. 14.
[223] L. Tintori and E. Borsook, *Giotto: The Peruzzi Chapel*, pp. 59, 91.

and may require a particular medium not used for other colors. For the Byzantine period we have the mention of lime and chalk common to Theophilus, Cennini, and Dionysios of Fourna, as a medium for wall painting, and observation of the paint layers in Byzantine wall paintings indicates that one of these was a principal medium for Byzantine painters.

The long lasting quality of so many Byzantine paintings suggests, as I have mentioned above, that lime, not chalk, was most commonly used. Whether or not the lime was combined with glue or casein to strengthen it cannot be determined by simple observation, but personal experience in coloring plaster repairs in the course of preservation work suggests to me that lime and some form of glue or casein was the most likely combination. Such a mixture gives exactly the texture of the original paintings and is well adapted for the bold and rapid covering of large areas. However, the pigments used to make the preliminary drawings and the ground colors, if dark, are without body, and were most probably mixed with a medium of water or lime water before being applied to fresh or dry plaster. The dark colors are uniformly thin on the wall, which means that, if they were not painted on the fresh plaster with water, some organic medium must have been used, but what it was is again impossible to determine by observation. The most practicable and universally obtainable media would have been eggs or the various forms of glue, and both of these are known from the texts to have been used. But lime was, I think, the medium most commonly used and this accounts for the well defined layers of paint by which a Byzantine wall painting was built up (figs. A2, 12a., 15–25, 28). Lime was susceptible of speedy manipulation in broad brush strokes, which was what the Byzantine painters wanted for the greater part of their compositions, but it could also be used to achieve more delicate effects as in flesh coloring (figs. A1, 23–25, 30–31). Its disadvantage, and that of all painting on fresh plaster, was the limited number of colors impervious to the chemical action of lime, but this was overcome by using other media for colors for finishing touches on the dry plaster. The majority of wall paintings of the Romanesque period in Western Europe seem to conform to a system of a build-up of layers, and it is likely that they were made with lime as the principal medium much as were Byzantine paintings, but other media were certainly employed as auxiliaries, and the example of Berzé-la-Ville shows that entirely different systems might have been employed.

The nature of the changes which took place in Italy in the latter half of the thirteenth century apparently concerned method at least as much as media. It was pointed out long ago by Berger,[224] and by Loumyer,[225] that much of the instruction given by Cennini was good Byzantine practice which the Italians inherited from the Greeks. As to the media employed, there was certainly no absolute change to any not employed hitherto, but observation suggests a much greater use of egg by the Italians, as is evident from the delicately hatched brush strokes, which seem to be typical of this medium.

[224] *Op. cit.*, pp. 96–97.
[225] *Les traditions techniques de la peinture médiévale*, p. 116 ff.

ORDER FOR COMPLETION OF INDIVIDUAL PARTS OF A PAINTING

The last problem to be considered is that of methods which painters used to color the individual parts of a picture such as architecture, rock backgrounds, garments, or flesh. Although difficult to resolve accurately, some account of this problem must be attempted, since it involves the two important questions of how painters handled their colors and what effects they wished to achieve. These are interrelated questions and will be examined together in the following discussion by referring to the texts and to paintings as in previous sections, but in the examination of them we shall be forced to leave the solid ground of descriptive fact and to enter into the marshlands of aesthetics, although I shall hope not to stray too far from the firmer path.

Vitruvius has nothing to contribute to the question of the order of applying colors to a wall, but he does give a clear pronouncement on the aim of painting: "For by painting an image is made of what is, or of what may be; for example, men, buildings, ships, and other objects; of these definite and circumscribed bodies, imitations are taken and fashioned in their likeness . . . . For pictures cannot be approved which do not resemble reality. Even if they have a fine and craftsmanlike finish, they are only to receive commendation if they exhibit their proper subject without transgressing the rules of art."[226] Here is a Roman dictum with which the academicians of the nineteenth century would have been in full agreement, and the fact is that, although nowadays most of us would not agree with Vitruvius, our vision is still controlled by his standards.

A full consideration of the account given by Pliny of the development of painting would be impossible here,[227] but some of its points are relevant to our problem. He sees the development in a schematized form, starting from simple outline drawing and working through various phases toward culmination in a true Vitruvian image of what is seen. The sort of developments which Pliny singles out are the discovery of light and shade, the distinction of male and female, the animation of facial features, the introduction of folds into the garments and of the transparency of material, the suggestion of depth in a picture, and the depiction of the state of mind or emotions of the human being. He gives us a few indications of what painters may have been doing with their colors, but it must be recognized that the deductions, which follow, are speculative:

The painter starts with an outline within which he puts a field of undifferentiated color. Then on this he draws lines of other tones of the same color, or of different colors, in order, for example, to achieve an appearance of folds in the garments. Third is the effort to achieve an effect of transparency, which may be assumed to be connected with the manipulation of white over a flesh color, very probably with the aid of an egg or glue medium, or by the intro-

[226] *On Architecture*, ed. and trans. F. Granger (Loeb), 2, Bk. 7, chap. 5, pp. 102–107.

[227] *Natural History*, ed. and trans. H. Rackham (Loeb), 9, Bk. 35, contains the history of painting. For a commentary on Pliny's account, see Andreas Rumpf, "Classical and Post-classical Greek Painting," *The Journal of Hellenic Studies*, 67 (1947 [1949]), pp. 10–21. For a commentary comparative to mine, made from a different point of view, see Walter F. Oakeshott, *Classical Inspiration in Medieval Art* (London, 1959), p. 5 ff.

duction of lead white in order to get rid of the opacity of the lime or chalk white. And an impression of depth and the differentiation of facial expression may be connected with the use of a greater number of tones of each color and of a greater number of different colors.

It seems fairly clear that the early stages referred to by Pliny may be thought of as a building up of layers of color, but later stages may consist of laying on and blending colors side by side rather than a building process. In Pliny's words, "The opposition between shine and light on the one hand and shade on the other was called contrast, while the juxtaposition of colours and their passage one into another was termed attunement."[228]

In discussing colors he distinguishes the natural from the artificial ones, a practice followed throughout the Middle Ages, and he is aware of the possibilities of modifying optical effects by applying one color over another. Concerning *chrysocolla*, or gold solder, he writes: "Before applying the sandy variety they put on a preliminary coating of black dye and pure white chalk: these serve to hold the gold-solder and give a softness of colour. As the pure chalk is of a very unctuous consistency and extremely tenacious owing to its smoothness, it is sprinkled with a coat of black, to prevent the extreme whiteness of the chalk from imparting a pale hue to the gold-solder."[229] In a further passage concerning a purple color he writes: "Painters using it put a coat of sandyx underneath and then add a coat of dark purple mixed with egg, and so produce the brilliance of cinnabar; if they wish instead to produce the glow of purple, they lay a coat of blue underneath, and then cover this with dark purple mixed with egg."[230]

Elsewhere he mentions the red ochre of Lemnos and Syrian color, which is made of sinopia and sandyx, as undercoatings for cinnabar.[231] If applied to walls these sorts of color modifications would have to be carried out on fairly dry plaster, but unfortunately Pliny is seldom specific about the ground of which he is writing, and it was not his purpose to instruct in the methods of painting particular objects, for this was probably covered in the writings of the painters from which he drew his information.

Our next information about laying on colors is positively peremptory in its precision, but unspecific as to where the compounds are to be applied. It comes from three related manuscripts; in the sections *De Mixtionibus* and *Temperatura* of the *Mappae Clavicula*,[232] in chapters fifty-six and fifty-eight of Book Three of Heraclius,[233] and in Sections Two and Three of the *Liber de Coloribus*.[234] These manuscripts give us a system of three tones for each color. There is no indication of where or how much of the first-named tone is to be painted in, but it may be

[228] *Natural History*, ed. Rackham, 9, bk. 35, chap. 11, pp. 282–283.

[229] *Ibid.*, bk. 33, chap. 27, pp. 70–71.

[230] *Ibid.*, bk. 35, chap. 26, pp. 294–295.

[231] *Ibid.*, bk. 35, chap. 14, pp. 284–287; chap. 24, pp. 290–291.

[232] Thos. Phillipps, "Mappae Clavicula," *Archaeologia*, 32, pp. 188–189.

[233] *De coloribus et artibus Romanorum*, ed. A. Ilg in *Quellenschr. f. Kunstgesch. u. Kunsttechn.*, 4, pp. 92–97.

[234] Daniel V. Thompson, Jr., "*Liber de Coloribus Illuminatorum siue Pictorum* from *Sloane MS. No. 1754*," *Speculum*, 1 (1926), pp. 288–293.

deduced from the instructions for the next two that this first tone, which is of medium color value, is to be laid on as a flat field of color to serve as the ground for some figure or object in a painting. The second tone—the dark one—is accompanied by the instruction *incides*, and the third—the light one—is accompanied by the instruction *matizabis*. It is important to try and see what is meant by these two verbs. The literal meaning of *incidere* is "to break up" and this is most accurate with reference to Byzantine or mediaeval painting.[235] The verb "to shade," which has been used by translators, implies a soft transition from one color to another and carries with it the notion of a blending of colors which has been characteristic of the art of painting only since the widespread use of oil as a medium. Before the fourteenth century separation of color was the rule, and therefore the dictionary definition of this word is the better and more accurate one when tested by observation of painting of the period, for to translate it as "to shade" is to read into the art of the Middle Ages a technique quite foreign to it except where flesh colors were concerned.

Matizare or *maptizare* appears to be a translation of the Greek verb ματίζω, which is the same as ματεύω and means "to search" or "to seek." The Greek verb appears in the title of chapter twenty-four of Dionysios of Fourna, with a prefix added, Πῶς νὰ λαμματίζης φορέματα.[236] The dictionary definition seems to give an accurate description for paintings of the period if we add to it the adverb "out" and thus render *matizare* as "to search out," in the sense of "to highlight." This system of using three tones or colors appears in nearly all Byzantine churches with wall paintings. In the simpler cave churches of Turkey it is the predominant method of coloring (figs. A2, 26a, 29a, b), but in more elaborate monuments it is still to be found side by side with examples of more complex ways of coloring (figs. A2, 20–22, 26–28). An example of this three-tone instruction from the *Mappae Clavicula* reads:

"Break up *minium* of *caria* with brown, and search it out [highlight it] with ruby *minium*. Likewise, make a rose color with *minium* of *caria* and white lead; break it up with *minium* of *caria*, and search it out with white lead.

"Break up *folium* with brown and search it out [highlight it] with white lead. Likewise, mix *folium* and white lead; break it up with *folium*, and search it out with white lead.

"Break up orpiment with vermilion, and it is not to be searched out because it detests all other colors."[237]

Byzantine church walls give ample proof of the use of this threetone method.

The difference between a coloring system of this sort and other methods was well put in a perceptive phrase by Byron and Talbot Rice when they wrote of

[235] A. Souter, *A Glossary of Later Latin to 600 A.D.*; M. P. Merrifield, *Original Treatises on the Arts of Painting* (London, 1849), p. 250. Mrs. Merrifield translates *incidere* as "to shade," and successive translators have agreed with this.

[236] Another example of transliteration from Greek into Latin is the *psimithi* of the *Mappae Clavicula*, which in chapter forty-four of Dionysios of Fourna is ψιμύθι. This is white lead, the making of which Pliny explains and of which the Latin name is *cerusa*.

[237] Thos. Phillipps, *op. cit.*, pp. 188–189. The colors cited would be more suitable for manuscripts than walls, but this does not invalidate the example. It points to the logical conclusion that the three-tone system was common to both manuscript and wall painting. For Byzantine examples, see page 163.

the Florentine and Siennese painters: "They modelled, the Greeks built."[238] This sums up, as we shall see, a fundamental change in the method of making a painting.

Heraclius gives a little more information than does the *Mappae Clavicula* about the laying on of colors. His chapter fifty begins *Colorum alii sunt albi, alii nigri, alii sunt medii*,[239] and continues with a description of intermediary colors in such a way as to suggest some similarity with chapter sixteen of Theophilus, to be discussed below, and with the basic principles of the Munsell color guide;[240] although of course the parallel is not to be pushed too far. A later part of the same chapter reads: *In qua commixtione, et in eo modo quo in pictura alter alteri post se ponuntur, summa est subtilitas; siquidem post album, niger, aut rubeus medius, convenit; quoniam crocus, in temperatione, mediocritas secunda est, quia color nimium spissus, et nimium tenuis, cito deficit.*[241] (In this mixture, and in the order in which one is laid over another in painting, great skill is exercised. Thus after white, black or red are suitable as intermediate [colors], because yellow, in composition, is in the second degree of mediocrity, for a color too thick or too thin soon alters.) This is a passage which brings to mind the painters of the Roman period; and sources as late as Dionysios of Fourna knew of the necessity of neutralizing the optical effects of a white background by coloring it in the early stages of creating a painting.

On color mixing Heraclius is fairly clear in chapter fifty-two, which is headed *De colorum commixtione, et quales ipsi colores sunt, praecipue infectivi, quibus uttur propter aliorum colorum inopiam* and begins with the unequivocal statement *Colores autem omnes commixtione corrumpi manifestum est.*[242] This certainly defines the mediaeval painters' attitude toward the mixing of colors, but perhaps it is a little too forcefully stated, and a copyist may have substituted "all" in place of "some." Thus, Heraclius' text represents something of an advance on the simple receipt book in that it does contain certain instructions for what to do with the colors as opposed to receipts for making them, and in the short sentence about black, white, and intermediate colors, it implies something of a thoughtful approach to the nature of colors, which gives a link, albeit a tenuous one, between speculation about color in the Ancient World and Alberti's thinking on the subject.

Our next text is that of Theophilus who represents a further stage in the transformation of receipt books into painters' manuals, since he gives us specific instructions on how to color the various parts of a painting, and indeed there is more of this type of instruction than there are receipts for making or obtaining colors.[243] For the painting of flesh—and of faces in particular—Theophilus first

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[238] Robert Byron and David Talbot Rice, *The Birth of Western Painting* (London, 1930), p. 101.
[239] *De Coloribus*, ed. Ilg, p. 85.
[240] Albert H. Munsell, *A Color Notation*. An Illustrated System Defining all Colors and Their Relations by Measured scales of Hue, Value, and Chroma, 10th ed. (Baltimore, 1946).
[241] Heraclius, *op. cit.*, p. 87.
[242] *Ibid.*, p. 89.
[243] C. Dodwell, ed. and trans., *Theophilus: The Various Arts*, Bk. 1; J. Hawthorne and C. Smith, *On Diverse Arts. The Treatise of Theophilus*, Bk. 1. Chapter references are given in the text in order to avoid separate footnotes for each citation; the same system is followed for Cennini and Dionysios of Fourna.

recommends eight colors, most of which are composites in themselves, so that there is a remarkable range of color for the painting of flesh alone. The order of painting appears to be:

1. an over-all ground of flesh color	5. *veneda* for the eyes	
2. a first shadow pigment	6. the second shadow pigment	
3. a first rose pigment	7. the second rose pigment	
4. a first high-light pigment	8. the second high-light pigment	

He tells us where to put the pigments in a systematic manner, and then in the following three chapters proceeds with the order of coloring for the hair and beards. Chapter thirteen adds some detailed instructions, and three more colors for the painting of flesh, particularly of faces. Altogether, therefore, he lists eleven colors for use in the painting of flesh, beginning with a medium tone for the ground on which areas of shadow and high light are built up.

In chapter six there is a final phrase *et cum aqua lavabis* (and wash with water). This seems to be an instruction for softening or blending over the junction of two colors with a wet brush, and Theophilus' translators have usually given the phrase this meaning. Only Roosen-Runge dismisses the phrase with an exclamation mark, apparently regarding it as nonsense.[244] That Theophilus is instructing us to blend out the border between two colors seems the most likely interpretation of his meaning, and, if this be so, it is important for it is his only mention of it and in fact the first mention of such a thing in any mediaeval text.

Chapters eight and nine contain the instruction *fac subtiles tractus* (make fine strokes). This must be an instruction for the finely hatched brush strokes necessary, as we shall see below, to give an impression of softening or blending.

In chapter fourteen there are instructions for the painting of garments which follow an order like that for flesh, with a medium over-all ground color followed first by shadow tones and then by high-light tones. The colors and numbers of tones have been very conveniently tabulated by Waetzoldt,[245] and seventeen colors are mentioned, each having up to five different tones.

Chapter fifteen, on wall painting, begins with the single color ochre for a garment and gives shadow tones for it, which is a return to a much simpler method that he has discussed previously. The text reads: *In muro vero imple vestimentum cum ogra, addito ei modico calcis propter fulgorem, et fac umbras eius sive cum simplici rubeo sive cum prasino vel ex posc, qui fiat ex ipsa ogra et viridi.* (For walls fill in the clothing with ochre, adding to it a little white for the high lights, and make the shadows either with plain umber, or with green earth, or out of *posc* which is made from the same ochre and viridian.) Thus, we have here a three-tone system for yellow clothing. It differs from the earlier generalized three-tone system only in calling for the high-light color second instead of last. There is hardly a Byzantine church with wall paintings

[244] "Die Buchmalereirezepte des Theophilus," Münchner Jahrb. d. bildenden Kunst., Sar. 3, 3–4 p. 163.

[245] "Systematisches Verzeichnis der Farbnamen," *ibid.*, p. 157; J. Hawthorne and C. Smith, *op. cit.*, p. 25.

where examples of Theophilus' instruction may not be seen; its peculiarity being the high-light tone which is yellow rather than white.

Theophilus also gives us a ground color for the face with an indefinite number of shadow and lighter tones. The problem of the system of painting described in the second half of chapter fifteen has already been discussed; in addition we have the clear instructions that *veneda*, a color composed of black and lime, should always be laid under azurite and green, and when the *veneda* is dry, azurite or green tempered with egg may be spread upon it, a second coat being recommended to make it look more beautiful. This is the instruction for making the monochrome green and blue backgrounds of most Byzantine wall paintings. The last sentence runs, *Viride quoque misceatur cum suco et nigro* (green may also be mixed with *sucus* and black).

The colors, in chapter sixteen, which pertain to the rainbow band and to background objects in a painting have been tabulated by Hawthorne and Smith and by Waetzoldt. Here the principle of total differentiation is as rigidly employed as elsewhere, and the maximum number of tones of a single color is said to be twelve, which must be taken as representing a seldom achieved ideal rather than as a description or statement of common practice. This chapter on rainbows is in fact an elaboration of Heraclius' simple statement that of colors some are black, some white, and some are intermediate; as such it adds some strength to our link between the Classical and Renaissance worlds, and the system of Dr. Munsell.

There is no reference in this chapter to a system using a ground color with darker and lighter strips over it, but the last paragraph mentions undercoats: *Omnes colores, qui aliis supponuntur in muro, calce misceantur propter firmitatem. Sub lazur et sub menesc et sub viridi ponatur veneda, sub cenobrio rubeum, sub ogra et folio iidem colores calce mixti.* The British Museum version has the alternative reading *superponuntur*, but in either case it is clear that there is an over-all tone for the following colors: Blue, *menesc*, and green have an undercoat of grey; vermilion has an undercoat of red; and ochre and *folium* have undercoats of these same colors mixed with lime.

Heraclius, the *Mappae Clavicula*, and the *Liber de Coloribus*, as we have seen above, are cognizant of a three-tone system for colors, and are clear in their instructions about it. Theophilus by contrast represents a great advance on his predecessors, but it is an advance which is by no means clear, and much work remains to be done on Book One. What concerns our theme is that he lists eleven possible tones or colors to be used for flesh, up to five tones of each individual color for a garment, three tones for ochre on a wall, three colors but an indefinite number of tones for flesh on the wall, and up to twelve tones of each color for the representation of the rainbow. The order in which the colors are to be laid on for flesh, hair, and garments, with the exception of yellow garments, is that of a medium tone for the whole ground, followed by darker and lighter tones for particular areas. In the construction of a rainbow, however, there appears to be no question of a ground color, and each tone is to be applied in strips of color, one beside the other.

How much of this rich palette was applicable specifically to walls is not clear, but certain it is that no mediaeval or Byzantine wall paintings exist which show us such variety. It is more likely that Theophilus has included with some good practical instructions an account of an ideal range of colors such as might well have been evolved in a workshop of Byzantium, and that he has not bothered to make it clear when he was quoting from one source or another.

Cennini is more precise than Theophilus, and in his chapter sixty-seven gives three systems for painting a face in *fresco*. In the first he has seven colors in the following order:

1. *verdaccio* for the drawing
2. terre-verte for the shadows
3. *verdaccio* again
4. lime white
5. pink of flesh color on the lips and cheeks
6. a thin wash of flesh color
7. white for the high lights

His second system, which he does not recommend, is less complex:

1. flesh color
2. *verdaccio*
3. flesh color
4. white high lights

But it is his third system which he really recommends, introducing it with the pleasing passage: "But you follow this method in everything which I shall teach you about painting: for Giotto, the great master, followed it. He had Taddeo Gaddi of Florence as his pupil for twenty-four years; and he was his godson. Taddeo had Agnolo, his son. Agnolo had me for twelve years: and so he started me on this method, by means of which Agnolo painted much more handsomely and freshly than Taddeo, his father, did."

The order of this system is:

1. terre-verte for the drawing
2. pink of flesh color on lips and cheeks
3, 4, 5. dishes of one lighter and two darker toned flesh colors, which, he remarks, are to be used for all exposed flesh, not just for faces
6. a still lighter flesh color
7. pure white
8. black
9. dark sinoper

For hair he recommends:

1. *verdaccio*
2. white
3. light ochre
4. dark ochre
5. sinoper

Turning to garments in *fresco* in chapter seventy-one, he recommends:

1. *verdaccio* for the drawing
2, 3, 4. three tones of the color chosen for the garment
5. lighter tone of same color
6. white
7. *cinabrese*

In chapter seventy-two Cennini repeats the same system for painting garments

on a dry wall, except that here he recommends the use of white lead in place of lime white. Chapters seventy-three to eighty-two deal with garments in various colors on fresh or dry plaster, usually with a system of four tones of the garment color, together with *verdaccio*, black, and white.

Chapter eighty-three is on the painting of a garment in azurite or ultramarine for Our Lady by a method which is different from those previously described. He does not mention whether or not a brush drawing should be done first, but he does say that an outline drawing must be scratched into the surface of the picture. The reason for this is found in the preceding sentence, where he writes that the work must begin with the laying of a complete undercoat or ground mixture of red and black in *fresco*; second, the azurite must by layed in three or four coats on the dry plaster; third, the folds are put on in a mixture of indigo and black. There is no high-lighting color, but he recommends achieving a lighter effect in the prominent places by roughening the azurite a little.

The difference between this method and those previously used for the depiction of draperies is that the previous ones did not recommend a layer system of color, whereas chapter eighty-three returns to the system of building colors recommended by the earlier texts; hence the need for incised drawing before the first ground color covered it up. Cennini's method of painting faces and figures also appears to demand an over-all ground color, but this is not entirely clear from his chapters on the subject since terre-verte or *verdaccio* seem to be recommended for the drawing only. In a later section (p. 94) on how to paint "dead" human figures he makes a further reference to ground color: "We shall next speak about the way to paint a dead man, that is, the face, the breast, and wherever in any part the nude may show. It is the same on panel as on wall: except that on a wall it is not necessary to lay in all over with terre-verte; it is enough if it is laid in the transition between the shadows and the flesh colors. But on a panel lay it in as usual, as you were taught for a colored or live face. . . ." The difference apparently is that when a "live" face is painted on a panel or a wall an over-all ground is used, but for a "dead" face on a wall an over-all ground is not required.

Chapter eighty-five is on the representation of mountains in *fresco* or *secco* and instructs that these should be built up in the same way as are figures; so here again it is uncertain as to whether there is an over-all ground tone for wall painting. The chapter ends with a recognition of the fact that light colors give an impression of standing forward, whereas dark colors recede: "And the farther away you have to make the mountains look, the darker you make your colors; and the nearer you are making them seem, the lighter you make the colors." Chapter eighty-eight adds that to acquire a good style for mountains the artist should collect a few large stones and copy them.

Chapter eighty-six on trees, plants, and foliage is clear about the necessity of using an over-all black base, and its statement that these things cannot be painted on fresh plaster has already been quoted above. The order of painting here is:

1. black ground
2. malachite

3. lighter green mixed with
   giallorino
4. straight *giallorino*

Chapter eighty-seven recommends the same build up of colors for buildings as for figures and instructs us as to perspective for them: "And put in the building by this uniform system: that the moldings which you make at the top of the building should slant downward from the edge next to the roof; the molding in the middle of the building, halfway up the face, must be quite level and even; the molding at the base of the building underneath must slant upward, in the opposite sense to the upper molding, which slants downward." This indicates a Roman system of perspective, but the links by which it descended to Cennini are a matter for speculation.

In later sections he gives instructions for the imitating of various textures of garments, to be achieved by a layering of colors; for example, silks are to be done with a ground color and a lighter tone of the same or a similar color is to be hatched over it. There is also a section on the painting of water, the transparency of which is to be brought about by the use of an oil medium, or by thin coatings of terreverte or malachite, presumably in an egg medium.

It is beyond the theme of this essay to give a more complete account of Cennini's methods of painting, which have been admirably expounded in the authoritative work on the subject by D. V. Thompson.[246] Two more points, however, are worthy of attention. The first is that Cennini invariably refers to a system of making up the basic color in three different tones—each in its own dish—by adding darker or lighter ingredients, although he also invariably recommends the use of a fourth tone of the basic color, and a fourth dish for it. That he thus separated the three tones from the fourth in this apparently unnecessary manner is due perhaps to some ingrained habit stemming from the earlier three-tone tradition of the *Mappae Clavicula*, Heraclius, and the *Liber de Coloribus*. The second point, which is of greater importance, is that in more than half a dozen chapters Cennini uses the verb *sfumare* in connection with the application of colors. Thompson renders this "to blend," and, excepting only the phrase used by Theophilus, *supra*, p. 117, it is the first explicit instruction of this nature given by any of the texts.

Like Theophilus and Cennini, Dionysios of Fourna begins his instructions for particular parts of a composition with the painting of the face and the flesh. His instructions in paragraphs sixteen to twenty-three appear to recommend six colors, in the following order:

1. an over-all dark base of a composite color, which he calls *proplasmos*
2. a composite of black and *oxy* for the drawing
3. black to reinforce feature drawing

4. a composite called *glycasmos* for the flesh
5. a shadow color
6. white

[246] *The Practice of Tempera Painting* (New Haven, 1936).

However, in paragraphs twenty-two and twenty-three he adds to these six, *bole* as red for cheeks, cinnabar for lips, and mixtures of cinnabar and white or cinnabar and other unspecified colors for flesh, so that we end up with an uncertain number of face and flesh colors and tones. This, writes Dionysios of Fourna, is the method of Panselinos, but there is another and simpler method in paragraph twenty-two-recommended for Our Lady and for young saints. This is to begin with the flesh color and to build up the face from that, unfortunately without clear instruction of how many colors to use.

Paragraph twenty-three on hair and beards is more than half concerned with the painting of lips and cheeks, and it must represent a confusion of two separate paragraphs. In so far as it can be disentangled, it seems to recommend for the hair of Christ or young saints:

1. a reddish black ground
2. *proplasmos* mixed with black for the shadows

3. pure *proplasmos*
4. burnt ochre

For old men the system is:

1. ground of a mixture of white, black, and *proplasmos*
2. a lighter tone of the same mixture

3. black for the shadows
4. white high lights

Paragraph twenty-four is on garments and gives a three-tone system, as follows:

1. over-all ground color
2. lighter areas, with white added to the ground color
3. shadow with a darker tone of the same color
4. white high lights

Paragraphs forty-nine and fifty are on the methods of Muscovite and Cretan painters respectively, but they are not very informative about the laying on of color. Forty-nine gives a background color made up of a mixture of indigo and white and Persian blue, with an egg tempera, upon which high lights of gold leaf may be added.

Paragraph fifty, on the Cretan methods for painting a garment, seems to indicate a three-tone system with a medium ground, but the text is not very clear:

Τὰ μὲν φορέματα ποίησον οὕτως. πρόπλασον αὐτὰ βαθεά καὶ ἄνοιξον καὶ λαμμάτισον αὐτὰ δύο τρία λάμματα, εἶτα ψιμύθισον·

The position of the full stop in this text makes it certain that the white high lights relate to the garments, which makes good sense; whereas in Didron's translation the white is given as the starting point for the painting of figures, which does not make sense. Face, hands, and feet are to be done in six colors:

1. the dark over-all ground
2. black for the drawing
3. flesh color

4. a lighter flesh color
5. a darker flesh color
6. white

For the hair of young people the Cretans used:

1. a dark ground
2. black for drawing

3. lighter parts which must merge into the darker

Finally, for the hair of old people they used linseed oil as a medium for the high lights.

Paragraphs fifty-three to seventy deal specifically with wall painting, but are not very specific in their directions. These give a very jumbled impression of incompleteness which may perhaps be cleared up by their collation with other manuscripts of the Manual. For the face and flesh a complex and quick method of painting is described with ingredients differing slightly from those named above, and there are some variable instructions for depicting young and old men. In paragraph sixty-six he designates the white used for ikons, *tsingiari*, names azurite, *lac*, and orpiment as the colors which should be used on walls, and recommends that cinnabar, mixed with a quantity of white or Constantinopolitan ochre, be used only on indoor walls, since on exterior walls it will turn black. In paragraphs sixty-five and sixty-eight he gives instructions for the use of azurite on walls; sixty-five is devoted to the making of azure high lights, presumably for a garment, and he recommends mixing it with indigo and white; sixty-eight prescribes a medium of boiled bran water, and instructs that azurite be used only on dry walls.

Berger, Lady Herringham, and Loumyer, have all pointed out resemblances between the instructions of Dionysios of Fourna, Cennini, and Theophilus, and perhaps the time has come to hazard a hypothesis as to why these resemblances occur. There are enough organizational similarities between parts of Book One of Theophilus and parts of Cennini and Dionysios of Fourna to suggest that all three authors were familiar with a common source. The most striking points are the preponderant amount of instruction devoted to the painting of the face—followed in each case by sections on hair and the different treatment for young and old men—the sections on painting walls, and the various instructions on the handling of colors.

The earliest text in point of time is that of Theophilus, but he himself writes that he will instruct us in whatever the Greeks know of colors, and it is not too far fetched to assume that interred in these three texts we have a Byzantine manual of painting, as opposed to a receipt book of the earlier type. This hypothesis is one the author hopes to develop elsewhere, since it is not entirely germane to the present subject. It has been introduced here, first, to justify the citing of texts which some may consider to lie too far apart in time to be of use as accurate evidence for our subject, and, second, to reiterate what should already have become clear from the texts; namely, that these three authors do not represent merely three different methods of painting, as has been assumed by many commentators.

From actual examples of wall painting little more evidence can be gained as to the painting of individual elements in a composition than has already been cited in connection with the sequence of painting or with media. In the Ancient

World it seems generally to have been the practice to build up the form of figures or objects by means of an outline followed by the application of a ground color within the outline of the whole object or figure, and then with strokes of darker or lighter tones to give delineation to the form being depicted. This was the method of Cretan painting,[247] of at least some Hellenistic painting—as exemplified by the tomb at Kasanlak,[248] of the Etruscan Tomba del lètto funebre, and of much Roman painting. How well effects of transparency were achieved, and to what degree colors were laid side by side or blended must remain uncertain until more accurate descriptions are published. In the synagogue at Dura and elsewhere on the site the paintings were uniformly built in layers one on top of the other from a basic ground color, and observation of photos of the Catacomb paintings suggests the same building up of paint in layers.

In their *Peruzzi Chapel*, Tintori and Borsook remark of a lunette that the figures were painted with layers of semitransparent washes of color. And in the scene of the Naming of the Baptist they say that the flesh of the child and of Zacharias is built up from semitransparent washes of golden brown and palest milky pink. They contrast the execution of the Feast of Herod with that of other scenes in that it was carefully painted and the color laid layer over layer with much smaller strokes. Regarding particular colors, they tell us that the blue backgrounds were done in three ways: with a mixture of grey and azurite, with the same mixture painted over a grey ground, and again with this mixture over a red ground.[249]

Turning to Byzantine painting, we find that a similar system of color build up prevails. The earliest examples which I have studied are among the Cappadocian churches at Göreme, dating perhaps from the tenth century. In the Chapel of St. Theodore the faces have a yellow ground color and the feature lines are drawn in red. Of the garment colors, the white has an off-white ground, black shadow lines, and white high lights; the red has a pink ground (red plus white), two tones of red shadow color, and white high lights; the green is used by itself as a ground color and has black shadow lines; for the yellow a light yellow (yellow plus white) ground is used, with brown shadow lines and white high lights.

This method of using a single color as a ground and different colors to build up the linear form of the object portrayed—or, more rarely, of using up to three tones of a single color—represents Byzantine technique at its simplest. The same method was capable of elaboration more or less at the discretion of the painter through the use of a greater number of dishes in which different quantities of white or black were mixed with the basic color to achieve more tones, in the manner described by Cennini. In St. Theodore, Çavuş In, and the other early churches around Göreme, on Mt. Latmos above Bafa Gölu, and in

[247] P. Duell and R. Gettens, "A Review of the Problem of Aegean Wall Painting," *Technical Studies*, 10, no. 4 pp. 179–223.

[248] Assen Vassiliev, *Das Antike Grabmal bei Kasanlak* (Cologne–Berlin, 1959).

[249] *Giotto: The Peruzzi Chapel*, pp. 15–19.

other cave chapels in Anatolia there are good examples of this simple system (fig. 26a).

More elaborate coloring may be seen in the twelfth-century paintings where the single colors or single tones of color are reduced in area, and where the use of three tones of each color becomes common practice (figs. 27, 28). The three tones of a single color were normally enriched by the use of pure black and pure white for the shadows and high lights respectively, and occasionally by the use of a different color altogether, to add further variety. Common examples of the latter practice, which represents an elaboration of the early system, are the addition of red lines to the shadow tones of a yellow garment, or of pure blue as a form of shiny high-light color to a purple or an olive green garment (fig. A2), or of red as a shadow color for a green garment.

That the Byzantines were aware of the fact that light colors appear to stand forward in a painting while dark colors appear to recede is abundantly apparent in their painting of garments, even though they did not always use this knowledge to imitate reality, but preferred to subordinate it in the achievement of other pictorial effects. The effect appears in a garment which has, as always, a single over-all ground tone, but of which certain areas are elaborated only with lighter tones and white, while others are elaborated only with darker tones and black. The most common examples are the dark areas of garment around the stomach of a figure and around the lower calf and ankle, and light areas on the upper arm, the shoulder, and the thigh (fig. 27).

The order in which tones of color were built up for garments, architecture, mountains, and other background objects was commonly to paint in first an over-all medium ground tone, and then to build up the form with darker and lighter tones, finishing up with pure black and pure white. However, throughout the course of Byzantine painting a shorthand system survived; this used only an over-all ground tone and dark fold lines or outlines (fig. 26b). Factual evidence in the form of overlaps in layers of color and paint drips show that Byzantine painters usually worked in the manner of Father Joseph. As described by Didron he would finish one pot of color before moving on to another; by so doing he saved time and could work on several areas of his painting at once.

For work in all areas—excepting the painting of faces, which will be discussed below—one principle of procedure seems to have been of vital importance to Byzantine painters: however many tones of color might be used, they were to be mixed and blended only in their respective pots, never on the wall. The separation of colors and tones permits the description and analysis of a Byzantine wall painting to a degree of accuracy that is impossible in any style where colors and tones are blended together.[250] Adherence to this principle is one of the distinguishing characteristics of the Byzantine style, and is the technical explanation of the predominantly linear appearance of Byzantine paintings. Because of it, words like "shading" and "blending" are misleading when applied to Byzantine painting, since they describe methods of painting more appropriate to styles whose purpose was the imitation of nature. In particular, the

[250] See Appendix for a practical example.

separation of tones and colors is suited to flat and linear patterning, whereas the blending of them is of particular use in achieving a three dimensional effect of depth.

Most of us start with an unconscious, if not also a conscious, bias in favor of seeing a natural image in a painting, and centuries of dirt and damage have subordinated many Byzantine wall paintings to an appearance which fits in well with what we want to see (figs. 20b, 23). Dirt has a mellowing influence which is strongly on the side of naturalism, so that even after cleaning a wall painting, the ingrained grime that remains in a paint surface causes tonal differences that soften the original effect of contrast to a rounded three-dimensional appearance which might not have been intended. There may be those who share Ruskin's view that dirt possesses a mellowing and even spiritual quality which it imparts over the centuries, but some years spent in the cleaning trade have led the writer to regard it as an insidious enemy, the presence of which has spoilt the original linear design, vigor, and freshness of many Byzantine wall paintings.[251]

The true appearance of Byzantine paintings was clear to Vasari, who had the advantage of looking at them when they had not yet attained the mellowness of four more centuries of dirt. In the Prologue of Le Vite he writes:

> But in order that what I call antiquated, as opposed to antique, may be more easily understood: Antique were the things made before Constantine at Corinth, Athens, Rome, and other famous cities, made from the time of Nero, the Vespasians, Trajan, Hadrian, and Antoninus; whereas I call antiquated the others which from the time of St. Sylvester onward were made by a certain remnant of the Greeks who knew how to color rather than to paint. Because since in those wars (the sack of Rome and the barbarian invasions etc. mentioned earlier) the first excellent artists had died, as I said, to the remnant of those Greeks, antiquated but not antique, *nothing had remained but the outlines in a colored field.*[252]

And in the *Life of Cimabue*, Vasari praises him for one of his paintings:

> Making in this work the clothes, the gowns, and the other things a little more lively, natural, and softer than the manner of those Greeks. *Which, in painting just as in mosaic, was all full of lines and outlines.* The painters of those times had the aforesaid scabrous, clumsy, and uninspired manner, not through study, but by such usage taught one to another for many and many years, without ever thinking of improving the drawing, of the beauty of the color, or of any inventions which might have been good.[253]

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[251] D. Thompson, *The Materials of Medieval Painting*, pp. 99–100, for comment upon the effect of dirt on mediaeval paintings. He quotes a tag from Terence "We see their age in gloomy guise, Because we see it through our gloomy eyes."

[252] Ed. G. Milanese, 1, p. 242. I owe the felicitous rendering of *vechio* as "antiquated" to Mr. Isaac Thomas of the Catholic University of Washington, D. C. Earlier translators have rendered it simply as "old," but the consistently contemptuous tone which Vasari adopts whenever he refers to "those Greeks" and to mediaeval Greek painting convinces me that "antiquated" is much closer to his meaning. To Mr. Thomas and to Mrs. Fanny Bonajuto of Dumbarton Oaks I owe thanks for help with these translations, but if there are inaccuracies, the fault is mine.

[253] *Ibid.*, 1, p. 250. N. B. The italics in both of these quotations are my own, not Vasari's.

The color contrast and sharp distinctions of tone which so shocked Vasari were emphasized in Byzantine wall painting by the general opacity of the medium which was used. Any pigment to which lime or chalk white is added acquires an opaque body which does not allow of the modifications of tone made possible by the superposition of colors in a translucent medium. The only general exceptions to this are the colors azurite, ultramarine, and green, painted in a translucent medium over black to form the undifferentiated backgrounds of most Byzantine wall paintings.

But despite the fact that these two characteristics—separation of different colors and opacity—are present throughout the history of Byzantine wall painting, there is evidence that at least some painters were concerned to escape beyond the barrier of limited effects for which these factors were responsible. The evidence is to be seen in three developments, all tending toward a more representational effect: first, an increase in the number of tones of each color which were used; second, those tones having close color value being painted in close proximity to each other on a wall, instead of in the often deliberate and unnatural juxtaposition of contrasting color, so that an effect of depth could be created, which, from a distance, often appears to be the result of blending color; third, the manipulation of white by hatching it on instead of laying it in in solid blocks of color, and by thinning it until it gave the effect of being transparent.

The first two points are self-explanatory and can be seen clearly in wall paintings of the thirteenth century, the most striking example being the paintings at Sopoćani. The hatching of the white high lights can be seen in all but the most provincial of Byzantine wall paintings, and its quality varies only in the skilfulness with which it was done, this appearing to become more delicate from the twelfth century onward. It is a procedure which mosaicists adopted when they wished to break up a field of color, and it can be found also in mediaeval tapestry work where again there was no possibility of blending color; hatching was therefore resorted to as a means of simulating the soft gradation of color. The use of a thin wash of white to achieve an effect of transparency is not common, but it can be seen in the loin cloth of Christ in the Pietà at Nerezi, and in a filmy white scarf around the neck of St. Helena in a painting of her at Asinou in Cyprus.

These deviations of method bring us to the one great exception to the rule of separation of tones of color and of different colors. The simple method of painting faces, as it can be seen in Byzantine wall paintings, was to lay in an over-all ground of a color approximating flesh and then to delineate the features on it in brown outlines with perhaps blobs of red added to emphasize the lips and the cheeks (figs. 26b, 29a–d). Black might also be used for emphasis of certain feature lines, and white for high lights. This is the second method of Theophilus, Cennini, and Dionysios of Fourna, and it seems to have been predominant in middle Byzantine wall paintings up to the twelfth century but continued thereafter for subsidiary figures in a composition, those whom the painter wanted to fashion as quickly as possible. The second and more complex

system of painting faces and flesh is that to which, as we have seen, the same three authors devote an enormous amount of attention (figs. A1, 2c–e, 14–17, 23–25, 29–31). In mediaeval wall paintings it is impossible to make a simple visual analysis of the second method, color by color or tone by tone, precisely because, in this method alone, colors appear to be blended with great skill and care (figs. A1).

Where faces have been damaged visual observation shows the presence of preliminary drawing in red or yellow, followed by an over-all green ground which has little body to it. After this the features seem to have been drawn, followed by a flesh color covering most of the face—but not the eye cavities, one side of the nose, and the receding sides of the face. How many tones of this flesh color were laid in is not clear, since the manner in which they were blended makes it impossible always to see even the impression of the brush marks. Finally, touches of vermilion were sometimes used to heighten the lips and cheeks, and black and white were employed for the emphasis of the feature lines and high lights. Faces and flesh made in this way are, in fact, the only parts of Byzantine wall painting where there is no sign that the painter was in a hurry; on the contrary, there is evidence that for these he exercized much care and expertise.

The rounded effect of blended flesh colors often makes Byzantine faces and flesh the least linear and most realistic part of a composition in that they appear to have depth and to approximate an imitation of nature, but, as with other parts of the painting, this realistic quality has been greatly over-emphasized for the same reasons already given above. Far too many human emotions have been read into the faces that stare out from Byzantine church walls because we like to see the emotion appropriate to the action, and to pay the painter a compliment. But it is a compliment of which he would have understood little and cared less, for his faces were stereotypes and his manner of varying them limited.

A close look at the faces shows only two generalized effects. One is an impression of calm and tranquility achieved by minimal use of line and by regularity and symmetry in all the lines of the features. The other is an impression of emotional disturbance. The latter is rarely, if ever, achieved by manipulation of the lines of the mouth, which remains an inert feature in both types of face; it lies instead in the manipulation of the eyebrow line, where a sharp curve or even an inverted V replaces the regular and rounded curve of the tranquil eyebrow. A similar distortion replaces the regular curve of the line of shadow beneath the eye which separates the eye cavity from the cheek (figs. 29–31).

It is the figure's posture and the context in which he is placed in a Byzantine painting that suggest or symbolize his emotions, but so powerful is the habit of association in us that we see grief in the face of a mourner, surprise in that of another figure, terror in another, or supplication in yet another, when in actuality the features in any one of these faces would do for those of any of the others. Similarly, the tranquil face has been described as noble, meek, pious, gentle, understanding, all-seeing, and so on. It is perhaps a measure of

the greatness or universality of Byzantine formalism that so great a number of scholars should have managed to discover so many and conflicting emotions in two such simple methods of portraying a face. In summary, the Byzantines painted, whether consciously or unconsciously, in a language of linear emotion, such as Seurat and some of his contemporaries were trying to evolve in the later nineteenth century.[254]

Wall paintings contemporary with those of the Byzantines, but existing in Western Europe, were made, as we have seen, by means of a similar system of layers, and the same media were probably in common use. The method of building up seems to have followed the same sequence as that for Byzantine painting, and, technically at least, Romanesque methods can be regarded as a simplified and adapted version of the Byzantine. It is largely this which accounts for the impression of familiarity which the western European visitor experiences on visiting the painted churches of Cappadocia.

The same simple palette, build up of colors, and rigid separation of them, are common to the Romanesque and the provincial Byzantine, but Romanesque painters seldom seem to have wished, or to have been able, to imitate the more sophisticated Byzantine methods. Thus, the well blended and trim Byzantine face never seems to have displaced the simpler and more striking face made up of separate colors, even in so sophisticated a decoration as S. Angelo in Formis, and contrast of color seems to have been much dearer to the heart of the Romanesque painter than it was to his Byzantine counterpart. An exception to this is the decoration of Berzé-la-Ville, where Mercier's analysis seems to show that the painter knew of and used the different optical effects of his glue and wax media.

When we come to the latter half of the thirteenth century and look at Italian wall paintings by Cavallini, Cimabue, or Giotto the first question that springs to mind is: why do there appear to be no lines in their work? A closer inspection shows that where a build up of color persists the lines are still there, but that they are somewhat more refined and carefully drawn, and that they have been softened to blend into the color used next to them. Cennini's instructions—already discussed above—contain in a dozen places precisely this admonition: blend colors carefully. They also make it clear that the Italians had begun to abandon the time-honored method of building up layers of color over an over-all ground color to create the form of a picture; instead Cennini recommends laying in the colors side by side, again with the instruction that the edges must be blended and well worked in together.

It is possible that the Byzantines began the practice of laying colors side by side, if chapter sixteen of Book One of Theophilus is to be interpreted as an

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[254] I hope that what I mean here by linear emotion may be clear to the reader, since a full definition and explanation of the term would need a separate essay. It is the exaggerated patterning of the garment folds (figs. 32–34) and the general lines of composition that are used by the Byzantine painter to stir our emotions. Perhaps the clearest and most commonly repeated examples are the exaggerated garment movements of the Archangel Gabriel of the Annunciation, as at Asinou (fig. 34a), contrasted with the calm, quiet folds of the garments of the Mother of God receiving the message. "Why is a weeping willow sad?" asked Van Gogh. Is it that a line with a downward curve like that of a willow equates with sadness in that part of our mind which analyzes what we see?

example of this method, but I have not seen actual evidence of it on any walls. This major innovation removed the necessity for incising the preliminary drawing, since it was not immediately covered by an over-all ground color, except, as we have already seen, in the case of a dark blue mantle which needed a ground of black to give the blue the richness of tone which the painter wanted, and to avoid the necessity of applying many coats of color, for blue was an expensive pigment. And it seems likely that other colors were still being built up over a ground while the new method of laying colors side by side gained in popularity.

Another modification that the Italians appear to have made was again not, strictly speaking, an innovation, but rather a most significant extension of the use of the egg medium for wall painting. The advantages of egg over lime as a medium were that it was capable of producing a wide variety of translucent effects, it could be used more easily for painting with a fine brush, and it allowed of a considerable increase in the range of color employed.

A third modification seems to have been a greater experimentation with painting on fresh plaster and an attempt to complete more of a painting while it was wet than the Byzantines generally tried to do. This is indicated by the Italians' use of smaller sections of plaster.

Experiments with different media and methods of painting may well account for the poor state of many wall paintings of the thirteenth and early fourteenth centuries in Italy, and for the fact that the Peruzzi Chapel was in need of repainting as early as the fifteenth century.

It is also of interest that modifications were being introduced into panel painting in much the same spirit of experimentation shown in wall painting, as indeed is logical, since painters seem to have worked as often and as readily on one as on the other, according to demand.[255]

In summary of these methods of coloring, which represent the final stage in the making of wall paintings, we must traverse some marshy ground, for the documentation is lamentably incomplete, but some broad, adventurous steps forward must be taken in hazard, and if the writer founders, he will do so happy in the conviction that others have extended the firm ground of knowledge of the subject further than he.

The Ancient World, then, seems to have known of methods of building colors in layers on top of one another, and Roman painters were aware of means of manipulating their color to achieve some effects of opacity and transparency, and of light and shade. The Byzantines took one principal medium—lime—from the Romans, and, leaving behind most of the complex optical effects which the Romans had developed in the service of imitating nature, they developed a layer system of predominantly opaque colors which was well adapted to the rapid painting of large areas of church walls in the service of a formalized religious art. Wall painting in Western Europe, contemporary with the Byzantine, shows largely the same coloring system in the service of the same ideals.

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[255] Christian Wolters, "A Tuscan Madonna of *c.* 1260: Technique and Conservation," *Studies in Conservation*, 2, no. 2 (October 1955), p. 87.

The Italians of the thirteenth century still painted in the service of religious art, but the formalism to which the Byzantine color system was so well adapted, seems to have lost all meaning for them; so they moved into a phase of experimentation with a corresponding liberalization of the manner in which they applied their colors, sometimes applying them in layers, sometimes side by side, sometimes on fresh plaster, sometimes blending them on the wall, and sometimes making use of opaque or transparent effects.

Conclusion

I hope that the reader who has stayed the course thus far in this protracted and ponderous plod through some of the processes of making a wall painting may feel that the technical facts have quite a lot to tell us about such a painting. The aesthetics, or spirit, which governs the choice of painting methods is matter for a different enquiry, but it has partly been my aim to point out that he who enjoys the spirit or taste but neglects to bear in mind the content of the fermentation and the type of alcoholic distillation at the heart of the whole matter, is liable to stumble into error and incoherence, as anyone who appreciates a drink will know.

There are always exceptions to the rule, but, while not minimizing their importance, some general characteristics of methods of wall painting and more particularly of Byzantine methods can perhaps be sorted out from the preceding survey:

Lime formed the basis of most plasters for wall painting in the Ancient World, and the Romans turned this form of interior decoration into a luxury art. In doing so they developed different methods of practicing the art which, though not yet fully described and analyzed, contain certain features that are outstanding. Roman painters seem to have known and to have made use of the binding strength of fresh plaster at least for the application of ground colors to which they liked to give a brilliant appearance, either simply by persistent polishing, or by the addition of oil or wax agents. They may occasionally have completed the design elements of their painting on the fresh plaster, but more often they used a medium. Perhaps they used a lime medium while the plaster was still drying, thereby utilizing further the binding properties inherent in the chemical changes which it undergoes; possibly they also used organic media in order to benefit from those colors which could not be used with fresh lime.

The fact that Pliny, Cennini, and Dionysios of Fourna list certain colors that may or may not be used on fresh plaster, while Theophilus also gives the impression—somewhat confused—that some colors may not be so used, could imply, as previous writers seem to have concluded, that those colors were never to be used on walls, but it could equally well imply only that they were not to be used until a wall was dry. Too many writers, elaborating on Vasari's simple statement that *fresco* is the best kind of painting, have imbued the word with a sort of moral fervor, and have viewed the use of any other method than water on fresh plaster as a sad lapse from virtue on the part of the painter. For myself, I find it

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difficult to see much harmful immorality in the breaking of an egg or the preparation of a glue, and most wall painters through the ages, would, I am sure, have risked any possible retributive measures by the gods or by the saints in favor of a greater variety of color in their painting.

Lime formed the basis of Byzantine wall plasters, and it was sometimes mixed with sand as a filler and sometimes contained fibrous binders such as chaff, hemp, tow, or cut straw. It was rendered in one to three layers, and was seldom of a depth of more than two or three centimeters.

The plaster was rendered by the painters themselves, who normally began work on the fresh plaster, making a patch of no standard area but which they preferred to be of the same size as the composition which they proposed to paint. They used lime as their principal medium, only finishing off with unmixed colors, blue, and black lines, probably mixed in an organic medium or media which have not yet been identified, but of which glue, casein, or egg would be the most likely candidates because of their availability. The use of lime meant that the artists' colors were largely opaque and that they built up the forms of the compositions by laying in grounds of color, usually of a medium tone, differentiating the grounds by painting over them in darker and lighter tones—always kept separate, except for the flesh tones—and finishing off with pure black and white.

To master this method of painting probably took several years, but, once achieved, an artist with his assistants was able to produce wall paintings at high speed. He knew most of the subjects of his paintings by heart and he knew exactly which colors came where in the sequence of his work. He met the greatest challenge of his work, therefore, at the beginning, when he had to fit a particular subject into the space available for it. Except for flesh coloring, where the brushes used must have been of small size, he used broad brushes and wielded them with speed.

The evidence of fast brushwork is clear from observation of the paintings, and proof of it is to be seen frequently, for instance, in the omission of the hand of a prophet in the dome of Ravanica, or of the halo of one of the angels in the dome of St. Sophia at Trebizond, or of the jewelled borders of a footstool at Asinou in Cyprus. Such omissions, together with brush strokes that seldom begin or end with absolute precision, lines of definition that rarely coincide accurately with the colors they are supposed to define, and the not uncommon presence of drips of paint from an overcharged brush which the painter has not bothered to wipe off, would be most improbable in a painting worked over for any length of time (figs. 22, 35, 36). To support what visual observation suggests, a few pieces of textual evidence are available. Two inscriptions, of the sixteenth and eighteenth centuries respectively, in the churches of Drača and Planinica in Serbia give exact dates for the completion of the paintings. They show that the painters must have covered an average of six to seven square meters of wall daily.[256] The early chronicles of Russia provide evidence of churches which were decorated in one year, meaning, in effect, in much less

[256] Radomir Nikolić, "The Working Day of a Medieval Painter," *Zograf*, no. 1 (Belgrade, 1966), p. 30.

than one year, since wall decoration could not be carried out during the frosty winter months. Some examples are the Cathedral of the Assumption at Vladimir begun in 1161 and finished on August 30 of that year; the church of Our Saviour of the Transfiguration of Nereditsa, decorated in 1199; and the church of the Resurrection in Novgorod, decorated in 1348.[257] Dmitriev assumes that the work would normally have been done by only one or two painters, with some assistants. From Romanesque France where much the same methods of wall painting were used, having, no doubt, been learned from the Byzantines, there is an inscription at Le Puy which says that the salle des morts, which abuts onto the cathedral and which has more than two hundred square meters of painting, was painted in one hundred days.[258]

The purpose of this systematized craft of painting was the efficient production of schematized and symbolic representations of the Life of Christ and other religious subjects over large areas of church walls. It seems to have developed its character in the post Iconoclastic centuries when the established custom was to cover the walls of a church with decoration. The versatility of the lime medium can be seen in the diverse character of the decorations made with it; on the one hand, it could be handled as at Sopoćani where the painters used it with a minimum of contrasting color and consequent effects of depth; or, on the other hand, it could be used, as did Theophanes, with agitated and nervous brush strokes, to push these same scenes to the verge of linear abstraction.

Byzantine painting was a utilitarian art begot of necessity because its richer sister, mosaic, demanded more money, more material, and more skill than were available to every little church needing pictures on its walls. No doubt in many instances the same master craftsmen practiced both arts, as the need arose, and certainly in the period up to the twelfth century there was an interpretation of wall painting as mosaic translated into paint. The painter handled his pigments so that they stand out, like mosaic cubes, in splendid isolation, and even when wall painting had grown to maturity in its own right, its sister art remained in the senior position, so that if a new dynasty of kings, such as the Nemanja of Serbia, could find neither the craftsmen nor, as was more likely, the materials for covering the walls of royal foundations with mosaics, these were imitated in complete gold leaf backgrounds mordanted to the walls, as at Mileševo, Sopoćani, and Bagnjska, and then tricked out with paint to look like cubes. By the fourteenth century the stylistic influence of mosaic had been broken, perhaps because the art was less and less frequently practiced and when it did reappear it was in a glorious soft decadence which had lost the strength and definition proper to the material and was imitative of the more subtle effects achieved with paint. Yet it had not lost its superior prestige over painting, as can be deduced from the patronage of a Metochites in Byzantium; though at Padua a Scrovegni, who might have demanded mosaic if he had so wished, chose paint.

[257] Iu. Dmitriev, "Zametki po tekhnike,", p. 243 ff.
[258] Paul Deschamps and Marc Thibout, *La peinture murale en France. Le haut moyen âge et l'époque romane* (Paris, 1951), pp. 78–79.

I have assumed that Romanesque and Italian wall painting up to the thirteenth century were based on the same predominant medium—lime—and on the same methods of execution in the service of a commonly understood and formalized religious ideal. It remains to summarize what happened to the methods which Byzantine painters taught to their Italian pupils.

That there was no revolutionary change, such as Cennini or Vasari seem to imply was wrought by Giotto, has I hope been made clear. However, there was certainly enough gradual change, developed in stages not as yet sufficiently studied, to cause a transformation in the general appearance of wall paintings. From the wall-painting methods of the Byzantines the Italians apparently adopted three characteristic processes, giving much greater attention to their wider application than did the Byzantines: from the painting of faces the Italians learned that colors or tones of colors could be blended on the wall and they applied this process to the whole of their compositions instead of to faces and flesh alone; from the handling of white and the impression of transparency to be got from it and from colors, such as blues and greens, used in a different medium than lime they learned that a great variety of effects and color modifications might be achieved, whereas the Byzantines were content with only a few; and from the use of delicate brushwork for faces and flesh they learned that, with more time dedicated to the task, the same delicate care could be spread to other areas of their composition, thus further increasing the variety of effects.

I have suggested that there is a sense in which Byzantine wall painting was born of, and displays, some of the characteristics of mosaic decoration. Italian wall painters seem to have sought inspiration from another branch of their craft, and carried some of the characteristics of panel painting into their work on walls. More specifically, it is probable that, adopting the egg medium in which most Byzantine panels were evidently executed, the Italians enormously increased its use in their wall painting. With it came the delicately hatched brushwork, translucent effects, and attention to detail of work on a smaller scale.

All of these modifications have one thing in common: they require more time for execution than was necessary to a painter keeping to the Byzantine method. Perhaps it was this time factor, as much as the influence of mosaic technique, which led to the use of smaller patches of surface plaster, and the relegation of preliminary drawing to the base layer of the plaster. This in turn might have led to experimentation with more painting on fresh plaster, or rather, more careful painting on fresh plaster. The diversity of plaster joins, which have been mapped out by Tintori and Meiss, suggests that much experimental work on methods was undertaken, as do also artists' mistakes, such as Cimabue's use of lead white at Assisi. Writers on Italian wall paintings tend to see the technical failures of their heroes as the result of their recourse to *secco* work. I prefer to regard these failures as an indication of experiment, since, as anyone who has seen the paintings of Sopoćani, which were exposed to the extreme heat and cold of a continental climate for the two hundred years during

which the church was roofless, will have realized, paintings of a mixed technique are remarkably durable. Individual Italian painters were, it is clear, questioning the worth of the methods in which they had been trained,[259] and painting was beginning to be transformed from a utilitarian craft in the service of a more or less stereotyped religious art into a virtuoso accomplishment commanding great respect and devoted to the imitation of nature in paintings retaining a religious content. The change is already clear in Cennini's precise book of instruction, much of it Byzantine in origin and mediaeval in spirit but containing advice about looking to nature as an exemplar which would have been nearly as foreign to a Byzantine painter as was Didron's conception of painting to that of Father Joseph.

When we come to Vasari the gap is complete both in method of execution and in spirit, and "those Greeks" had become the barbarous Byzantines, which they were to remain until some thought was given to their art once again in the latter half of the nineteenth century. In the preface to the second part of *Le Vite*, Vasari writes:

> Nor did painting command much better fortune in those times, save that, being then more in vogue by reason of the devotion of the people, it had more craftsmen, and therefore made more progress than the other two. Thus, it is seen that the Greek manner, first through the beginning made by Cimabue and then with the aid of Giotto, was wholly extinguished; and there arose a new one which I would fain call the manner of Giotto, seeing that it was discovered by him and by his disciples and then universally revered and imitated by all. By this manner, as we see, there were swept away the outlines that wholly enclosed the figures, and those staring eyes, and the feet stretched on tiptoe, and the pointed hands with the absence of shadows and other monstrous qualities of those Greeks, and good grace was given to the heads, and softness to the coloring. And Giotto in particular gave better attitudes to his figures, and revealed the first effort to give a certain liveliness to the heads and the folds of his draperies, which drew more toward nature than those of the men before him; and he discovered in part, something of the gradation and shortening of figures. Besides this, he made a beginning with the expression of emotions, so that fear, hope, rage, and love could in some sort be recognized; and he reduced his manner, which at first was harsh and rough, to a certain degree of softness; and although he did not make the eyes with that beautiful roundness that makes them lifelike, and with the tear channels that complete them, and the hair soft and the beards feathery, and the hands with their due joints and muscles and the nudes true to life, let him find excuse in the difficulty of the art and in the fact than he saw no better painter than himself . . . .[260]

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[259] G. Vasari, *op. cit.*, ed. Milanesi, 2, p. 563. Vasari describes the changes in technique for panel painting, but most of what he says is true also of wall painting, and he is precise to the point of mentioning blending and hatched brush strokes.

[260] Trans., G. du C. de Vere, p. 82.

The changed ideals are clear enough in the writings and in the paintings, and I have tried only to give something of precision to an account of the methods underlying the changes. Why these changes should have come about is beyond the scope of this essay to determine and lies in other fields than mine. The Byzantines, in short, were masters of a method of lime painting which they brought to perfection as a means of illustrating Holy Scripture in a formalized manner. The Italians inherited Byzantine methods and modified them into mixed techniques, still largely as a means of illustrating Holy Scripture, but interpreting it in natural and human terms by the imitation of nature. It was left to painters in oil to carry this aim to the ultimate point at which paint may achieve imitation—and to photographers to kill it as an ideal—leaving us with a wealth of methods for the application of paint which no previous age has possessed, but with no accepted ideal in the service of which these methods should be employed.

APPENDIX

Factual Description of Byzantine Wall Paintings

Complete accuracy in describing the colors or tones of color used by the Byzantine wall painter is impossible without the aid of laboratory analysis of samples. However, a high degree of accuracy can be achieved by visual observation, preferably with the aid of a magnifying glass with torch attachment, since the lighting of churches is often very inadequate.

The general value of an accurate description of colors would, presumably, not be open to question. The particular advantages are:

1. Clarity, gained by reducing the range of adjectives employed and the volume of writing engendered by subjective impressions.
2. Brevity, gained by defining an over-all color system instead of describing in detail the coloring of each individual item in each piece of painting.
3. Greater possibility of accurate comparison of the paintings of different churches by using a more precise analysis of color as an aid to the existing methods of iconographic and stylistic analysis. Assuming that photographic coverage of a group of paintings includes clear black and white photographs of each scene and individual saint and decorative pattern, description can be abbreviated, first, by describing the general system, then, by referring to it when writing of figures or other details in each picture.

A practical, if fairly complex, example of a general color system might thus take the form given below. In this case it is based on a group of paintings from Asinou in Cyprus.

Basic Colors:

Red, umber, blue, green, olive green, yellow, black, white, gold

Coloring of various parts of paintings:

Haloes — yellow ground, umber inner outline, white outer outline

Garments — approximately seventeen colors or tones of color

Red — red ground, umber fold lines, yellow high lights

Light red — light red ground, red wash intermediate fold color, umber fold lines, white highlighting used thinly as a wash and in thick opaque areas

Umber — umber ground, black fold lines and outlines.

Light umber — umber ground, black fold lines, red high lights

Lighter umber — umber ground, black fold lines, red high lights, grey wash high lights

Blue — grey ground, blue over most of the grey, black fold lines

Light blue — light blue ground, blue fold lines, grey wash as intermediate high light, white

Olive green — olive green ground, black fold lines.

Light olive green — olive green ground, black fold lines, green high lights, yellow high lights

Green — green ground, black wash (sometimes umber) intermediate shadow tone, black fold lines and outlines

Light green — green ground, black wash (sometimes umber) intermediate shadow tone, black fold lines, white highlighting used thinly as a wash and in thick opaque areas

Lighter green — light green ground, green fold lines, white

Yellow — yellow ground, umber wash intermediate shadow tone, umber fold lines, black outlines, yellow high lights

Light yellow — yellow ground, umber fold lines and outlines, light yellow high lights, white

Grey — grey ground, dark grey intermediate shadow tone, black fold lines and outlines, light grey high lights, white

White — white ground, green shadow lines, intermediate indefinable shadow wash

A second white — white ground, blackish pink intermediate shadow wash, red fold lines

Sandals — black

Flesh — approximately seven colors or tones of color. Visual analysis of flesh coloring is less accurate than for any other part of a Byzantine wall painting because the adjacent colors approximate very closely in tone and either are, or appear to be, blended one into another. Olive green ground, yellow flesh tone, rose, cream flesh tone, umber feature lines, black feature lines, white high lights

Hair — approximately five colors or tones of color

Young people — olive green ground, umber defining lines, black defining lines and some outlines, yellow high lights

Middle-aged people — olive green ground, umber defining lines, black defining lines and outlines, grey high lights

Old people — grey ground, umber defining lines, black defining lines and
　　some outlines, white high lights
Background — approximately seven colors or tones of color
Monochrome upper ground — black ground, blue over-all wash
　　　　　　　　　lower ground — black ground, green over-all wash
Rocks — light olive green ground, olive green intermediate shadow
　　wash and lines, black shadow lines, grey wash and line high lights,
　　white high lights

Summary

There will always be exceptions to the general system in some detail or other,
because a painter is not a machine and he may have to finish a dish of color on
an area where he would not otherwise use it, or he may experiment with some
new combination. But I have not yet seen a Byzantine church in which there
did not seem to be a general system of coloring serving as a basis for all the
more apparent variety of color.

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　　be seen that for many of the monuments the data is incomplete, which is because in the
　　beginning I was uncertain as to what to look for. I mention this in the hope that others will
　　be able to fill in the gaps in these tables which were unavoidable at this time.

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a. Trebizond, St. Sophia. Two-layer Plaster System with Ground Layer hatched to facilitate Adhesion of Upper Layer

b. Asinou. Plaster Join along Vertical Painted Red Border. Note that lower layer was painted before upper layer was rendered.

c. Asinou. Untidy Piece of Thirteenth-century Replastering over Twelfth-century Painting (composite print)

1. Plastering and Plaster Joins

a. Asinou, 1106. Length of Painted Red Border.
Join runs along uppermost of white borders and through a foot, painting of which was finished only when plaster section below was rendered.

b. Trebizond, St. Sophia. Beam hole.
Beam holes would have been filled and painted only when scaffolding was removed, after completion of register of painting.

c. Join following Outlines of Some Heads

d. Join following Outlines of Some Heads
Trebizond, St. Sophia

2. Plaster Joins along Outlines of Some Elements in Composition

e. Join along Base of Crown, around Base of Neck, and vertically on Right Side between Hair and Face

a.

b.
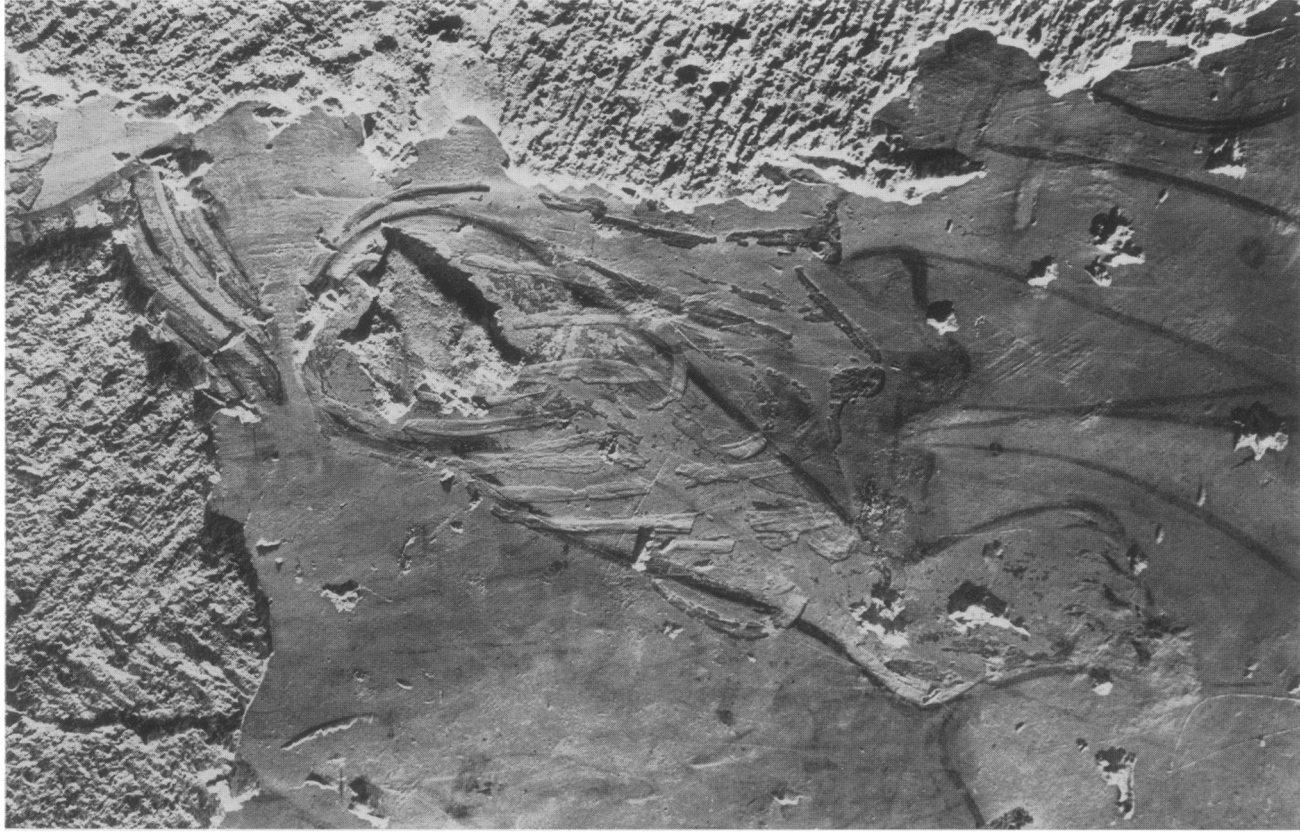
c.

Northeast Turkey, Haho Cami, Tenth–Twelfth Century. Details of Drawing for Mother of God with Christ Child. Note white high lights still adhering to plaster where all else except drawing has disappeared.

3. Preliminary Drawing

a.

b.

Cyprus, Perachorio, Church of the Holy Apostles, Second Half of Twelfth Century.
The Ascension, Heads of Apostles

4.   Preliminary Drawing

a.

b.

Perachorio, Apse. Heads of Bishops

5. Preliminary Drawing

a. Christ Child

b. Head of Donor

Asinou, Thirteenth Century?

6. Preliminary Drawing

a.

b.

c.

Trebizond, St. Sophia, Dome. Heads of Angels.
In Figure c a vertical plaster join can be seen at left, across the halo.

7.   Preliminary Drawing

a. Trebizond, St. Sophia. The Ascension.
Drawing of trumpeting angel, where painter sketched several different positions for wings, trumpet, feet, and clothing.

b. Cyprus, Kakopetria, St. Nicholas, Sixteenth
Century? Head of Bishop

c. Trebizond, St. Sophia. The Last Judgment,
Head of Angel

8.   Preliminary Drawing

b. Detail of Figure a

Trebizond, St. Sophia, South Porch. Drawings painted directly on Stonework

9. Preliminary Drawing for Practice or Amusement

a.

a. Trebizond, St. Sophia, North Porch. Angel or Dancing Girl on Stonework

b. Cappadocia, Direkli Kilise. Sketch of Mounted Figure

10. Preliminary Drawing for Practice or Amusement

b. Asinou, Apse, Thirteenth Century? Cloak of Mother of God

11. Incised Guide Lines. Clothing

a. Asinou, Narthex, Thirteenth Century? Saint Anastasia the Poison Curer.
Note the Incision continuing through Phial which She carries.

a. North Porch. The Prophet Gideon, detail of shoulders

b. Dome. Trailing End of Cloak of Prostrate Angel

Trebizond, St. Sophia

12.   Incised Guide Lines. Clothing

Trebizond, St. Sophia, Dome

13.   Incised Guide Lines. An Inscription

14.   Asinou, Narthex, Dome, 1333. Pantocrator
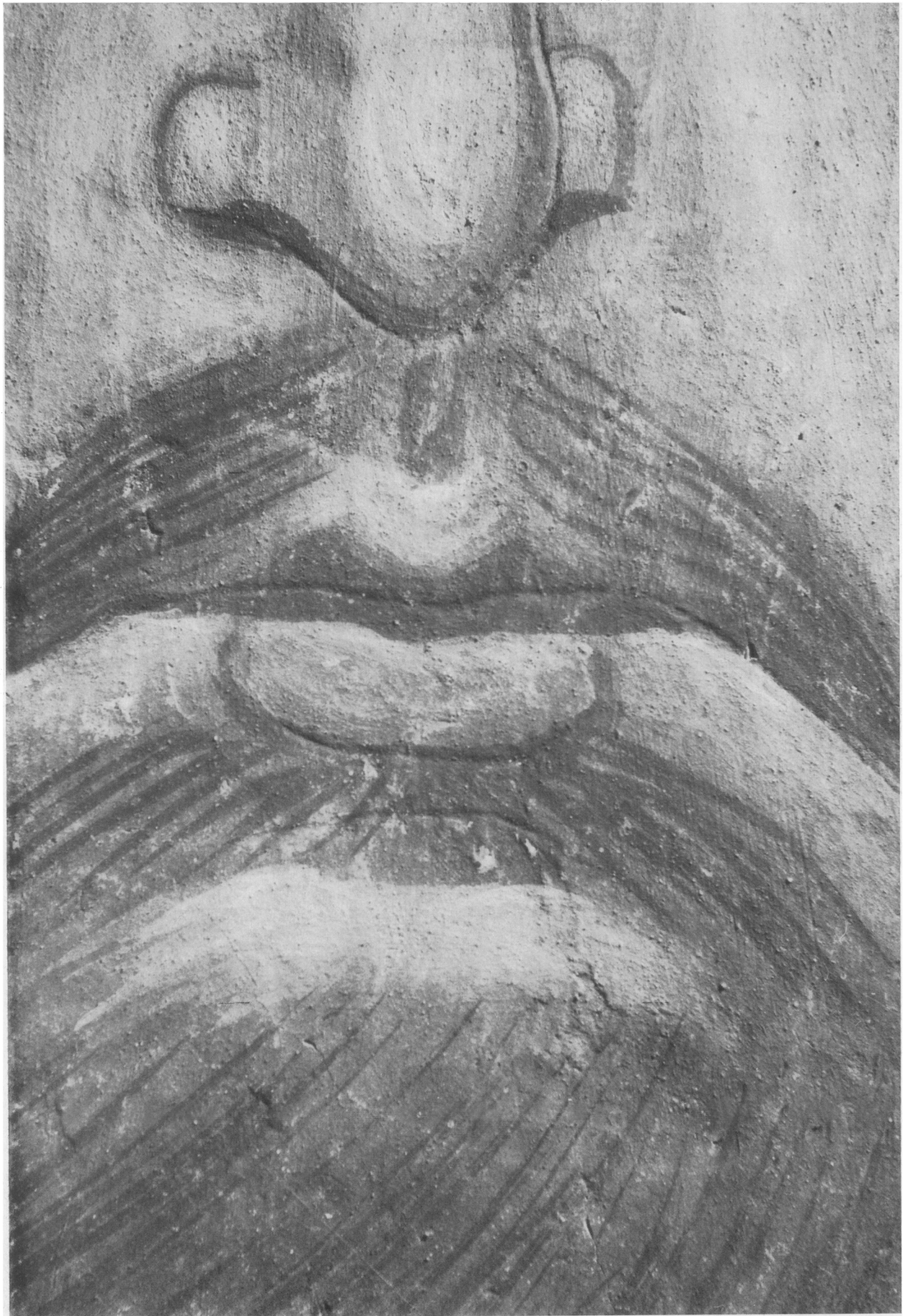
Detail of Figure 14, showing Mouth at Approximately Actual Size.
Note that brush strokes of thick and coarse ground color can be seen below thin coloring of design elements, where no brush marks are visible.

15.   Incised Guide Lines for Part of Face

Detail of Figure 14, showing Left Eye at Approximately Actual Size

16. Incised Guide Lines for Part of Face

Detail of Figure 14, showing Right Eye at Approximately Actual Size

17. Incised Guide Lines for Part of Face

a. Dome, Wing of Angel.

Note brush marks in thick, lighter colors, and lack of brush marks in thin, darker paint.

b. North Porch, Wing of Angel, with Hand painted over Finished Wing

Trebizond, St. Sophia

18.   Thickness and Layering of Paint. Wings

Trebizond, St. Sophia, Dome. Shoulder of Angel.
Darker tones are thin; lighter tones are thick.

19.   Thickness and Layering of Paint. Clothing

a. Asinou, 1106. Entry into Jerusalem, Forearm of Apostle, detail.

b. Asinou, 1106. St. Tichikos, Forearm, detail.

Linear nature of shadow tones has been blurred by dirt from sputtering of olive oil lamps and by soot from lamps and candles. Note again thickness of ground color, brush marks of which show through even white high lights

20.   Thickness and Layering of Paint. Clothing
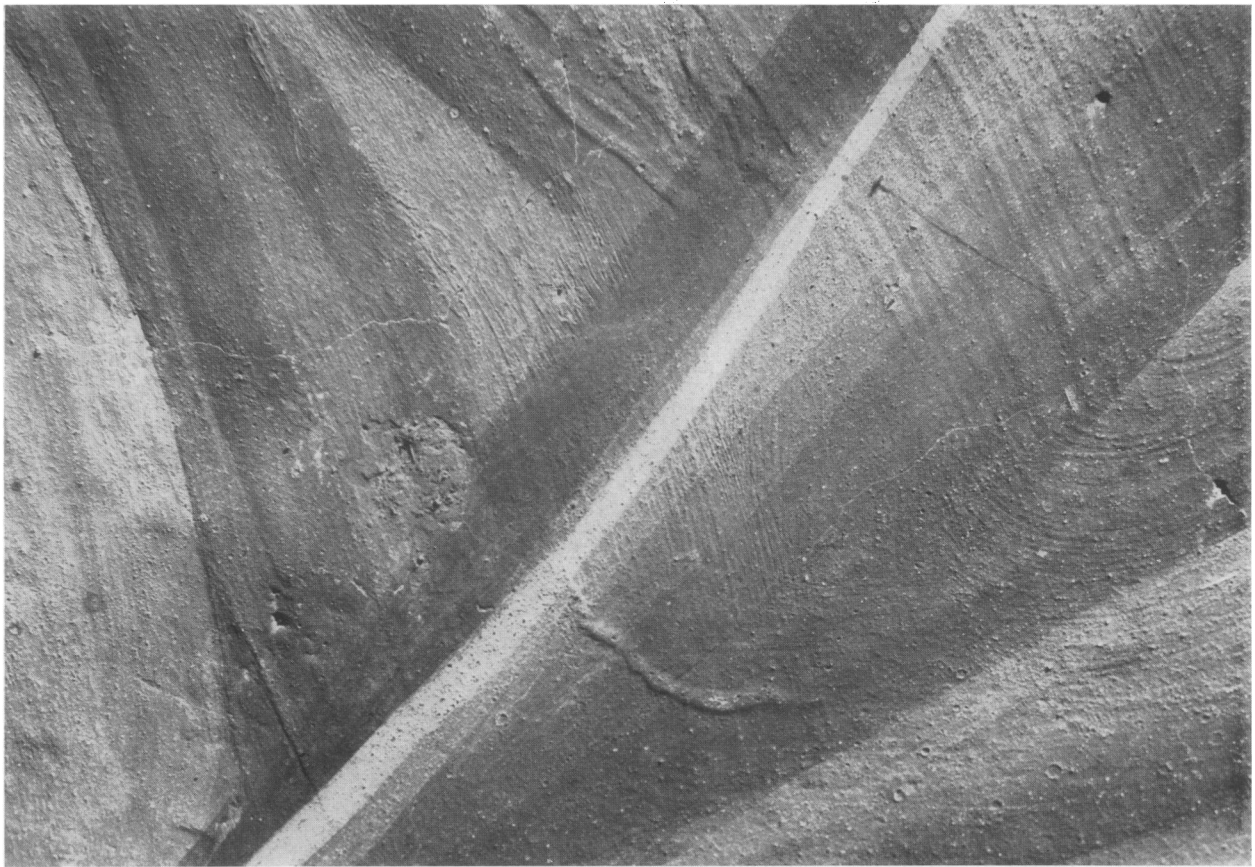
a.

b.

Asinou, Narthex, 1333

21. Thickness and Layering of Paint. Clothing

Asinou, 1106. St. Tichikos, Hand.

Note brush strokes for clothing continuing beneath hand, showing that it was painted after clothing. Note also evidence of hurried workmanship.

22.   Thickness and Layering of Paint. Flesh and Clothing

Trebizond, St. Sophia, North Porch. Head of Angel.

Note thick coloring beneath eye cavity and on bridge of nose. Note also how damage distracts the viewer's eye by breaking up the surface and interrupting the original clarity of the feature lines. The effect of these distractions is to soften and humanize the face.

23.   Thickness and Layering of Paint. Flesh
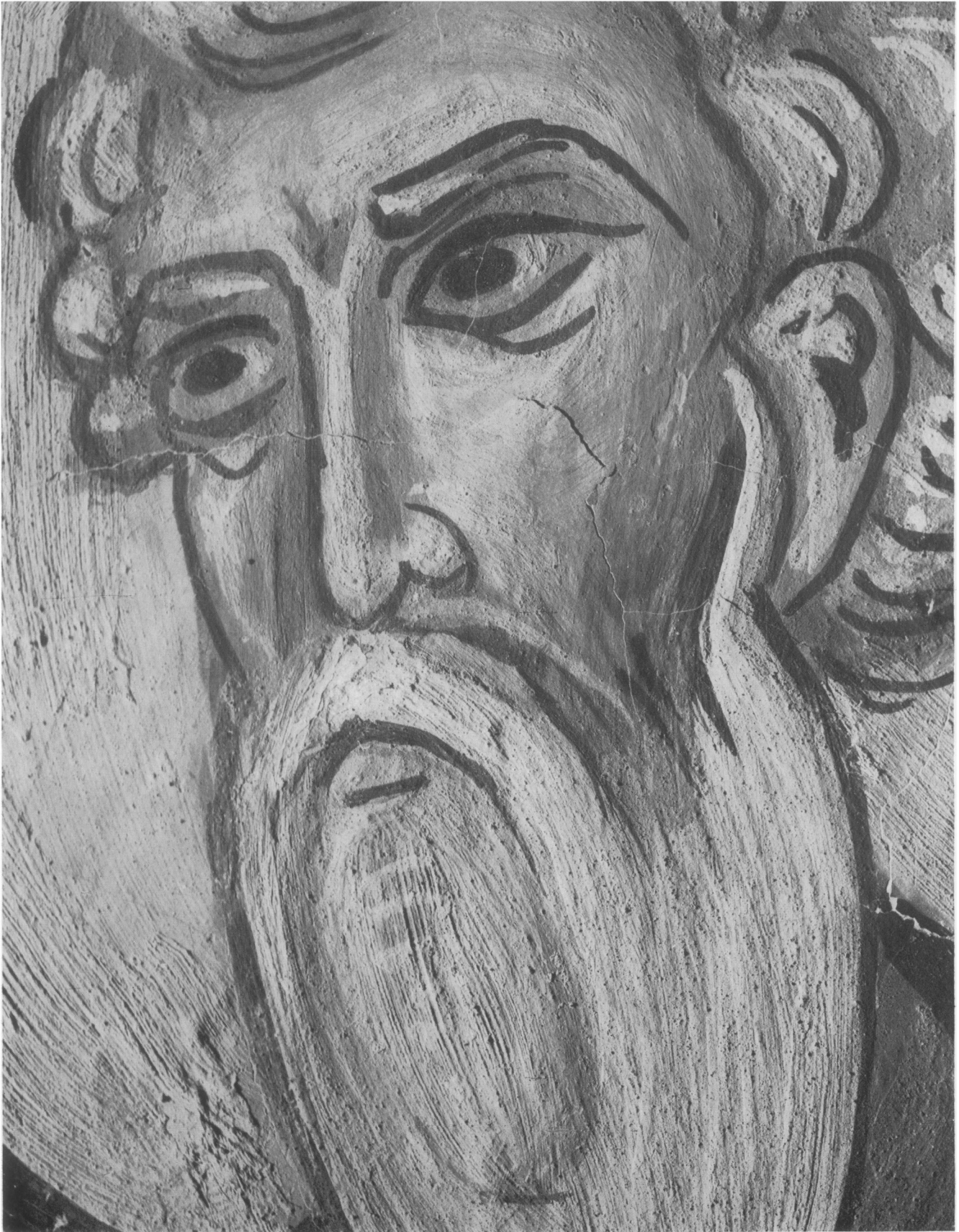
Asinou, 1106. St. Zosimos.

Note brush strokes of yellow halo running under paint of hair, and differing texture of different pigments (see Fig. A 1).

24. Thickness and Layering of Paint. Flesh
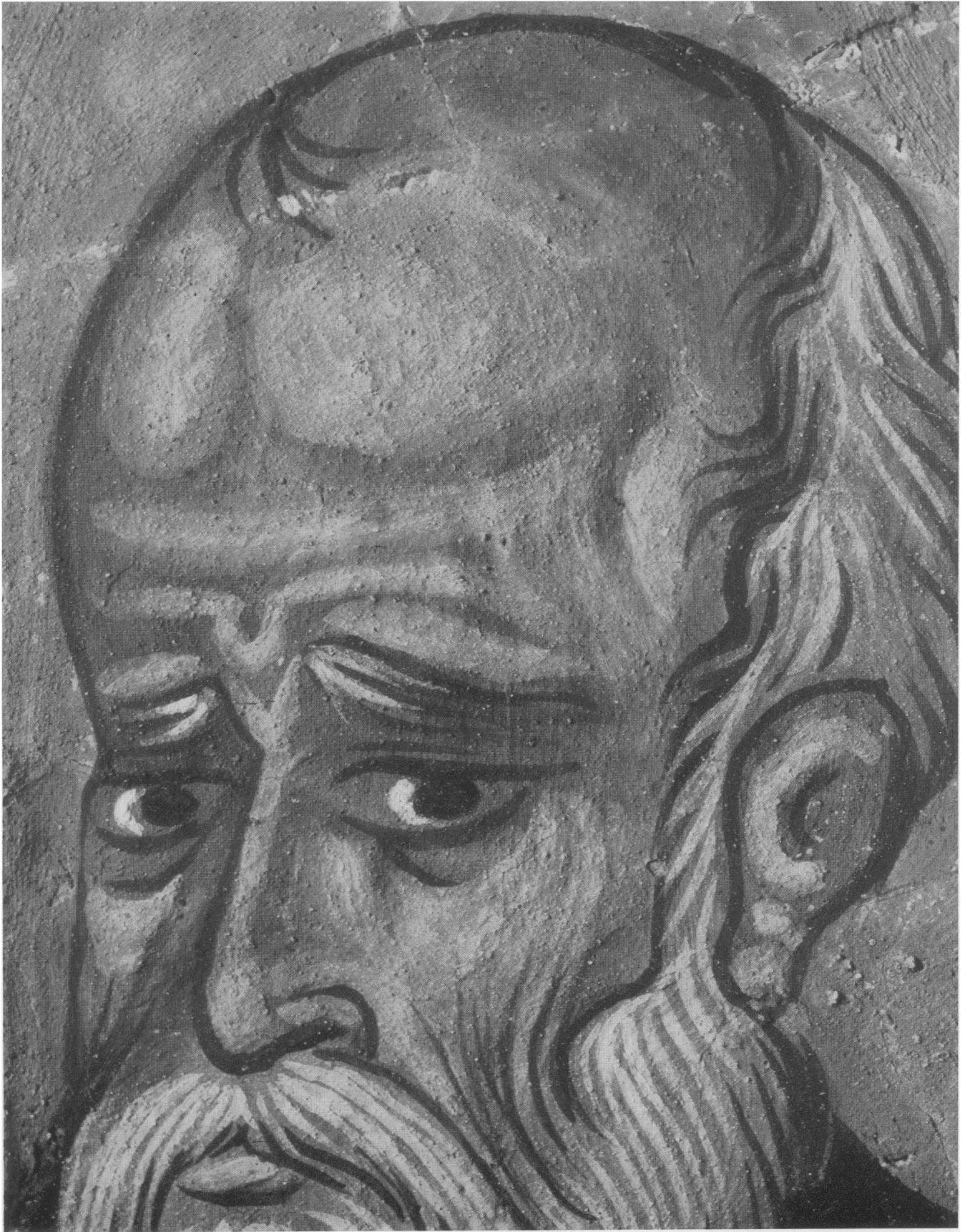
Asinou, 1333. An Apostle.

The method of building up color is exactly like that in Figure 24, but this painter has taken greater care with his brushwork.

25.   Thickness and Layering of Paint. Flesh

a. Cappadocia, Çavuş In, Tenth Century. Three-tone system; Ground Color, Black, White

b. Trebizond, St. Sophia. Two-tone System; Ground Color, Black.
Note distracting and softening effect of damage.

26. Tones of Color. Clothing

Asinou, Thirteenth Century? Five-tone System: Ground Color, Thin Black Wash Intermediate Shadow Color, Black Shadow Lines, White Wash Intermediate High Lights, White High Lights.

Note that in dark areas white high light is left out, while in light areas black shadow lines are left out.

27. Tones of Color. Clothing

Asinou, 1333. Four-tone System: Ground Color, Black Wash Intermediate Shadow Color, Black Shadow Lines, White High lights

28. Tones of Color, Clothing

e. Asinou, 1106
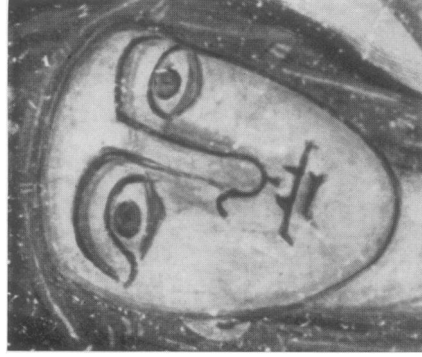
f. Asinou, 1106

c. Cappadocia, Eski Gümüş, Eleventh–twelfth Century

d. Cappadocia, Eski Gümüş, Eleventh–twelfth Century

a. Cappadocia, Çavuş In, Tenth Century

b. Cappadocia, Çavuş In, Tenth Century

29. Facial Expression when Faces are removed from their Contexts. Tranquility?

e. Asinou, 1333

f. Asinou, 1333

c. Trebizond, St. Sophia

d. Trebizond, St. Sophia

a. Asinou, 1106

b. Asinou, 1106

30. Facial Expression when Faces are removed from their Contexts. Tranquility?

b. Asinou, 1106

c. Asinou, 1106

a. Asinou, Thirteenth Century?

31. Facial Expression when Faces are removed from Their Contexts. Tranquility and Emotion?

a.

b.

Asinou, 1106

32.   Lines that evoke Emotion? Abstracts of Clothing Patterns

a. Asinou, Thirteenth Century?

b. Trebizond, St. Sophia, Thirteenth Century

33. Lines that evoke Emotion? Abstracts of Clothing Patterns

a. Asinou, Fourteenth Century?

b. Trebizond, Thirteenth Century

34. Lines that evoke Emotion? Abstracts of Clothing Patterns of Archangel Gabriel
of the Annunciation
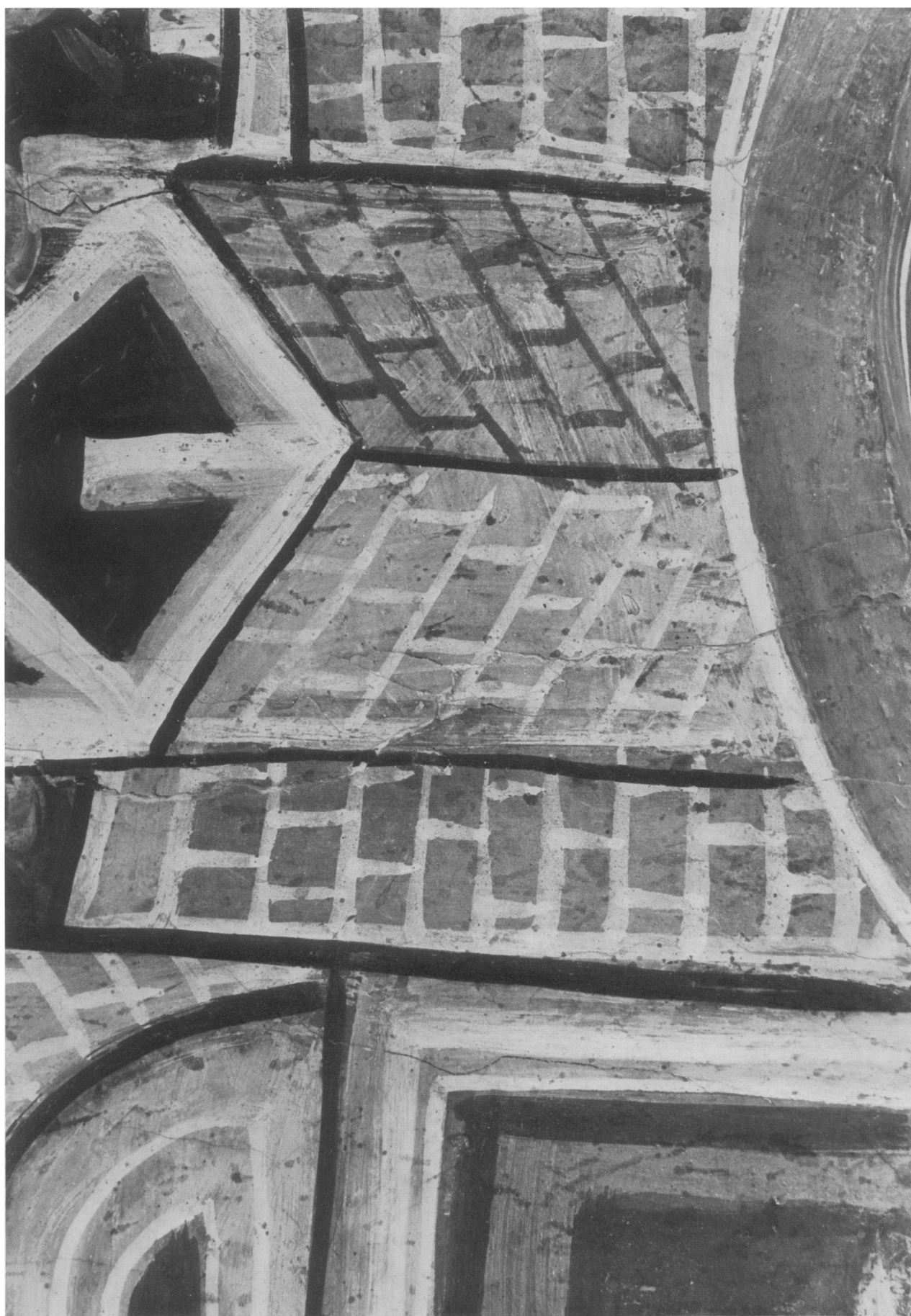
Asinou, 1106

35. Rapid Brush Work
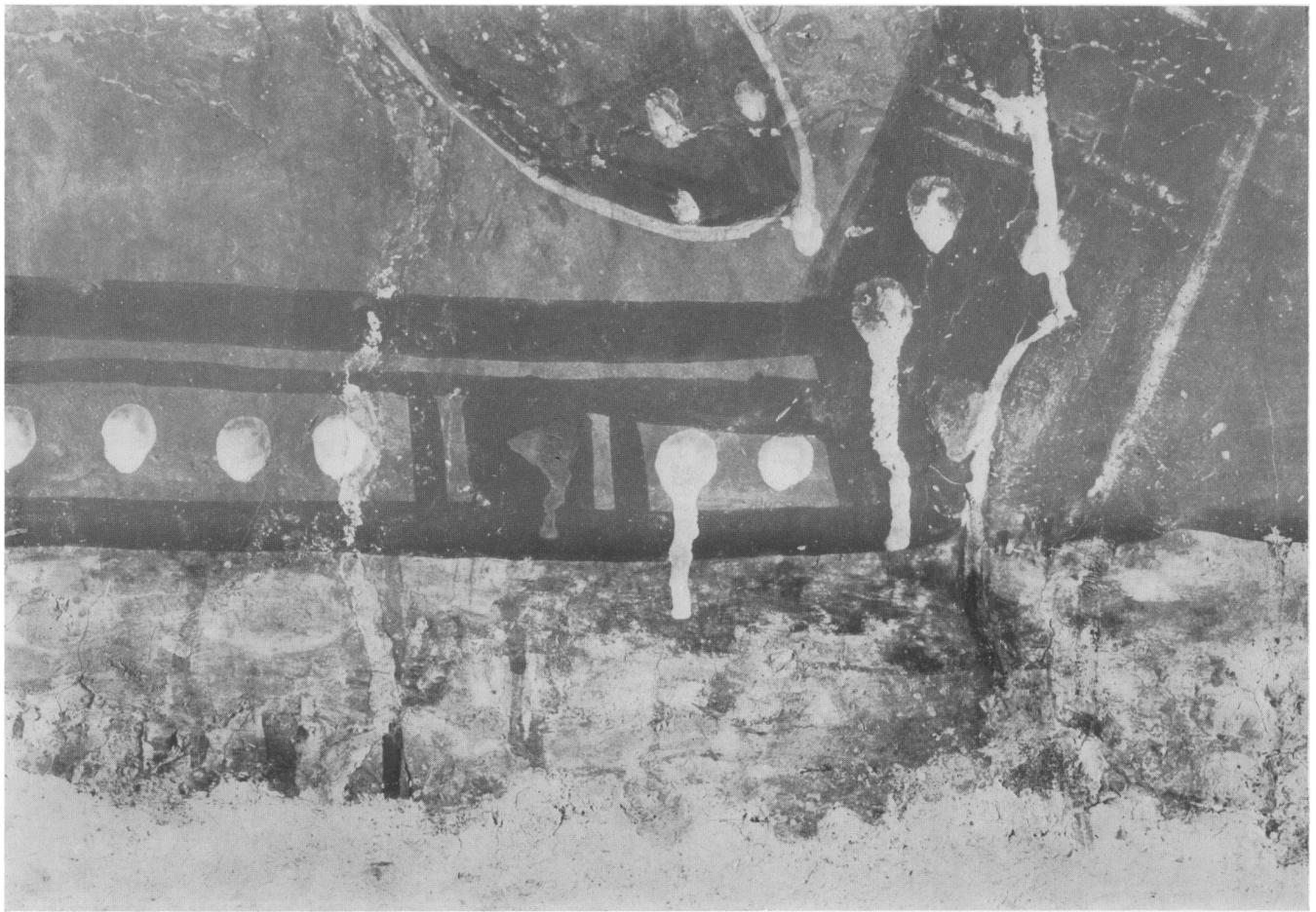
a. Asinou, Thirteenth Century?
Note paint drippings from overcharged brush, which painter neglected to wipe off.

b. Asinou, Fourteenth Century?

Note cursory blobs of paint to represent slippers, and outlines which seldom coincide exactly
with colors they are meant to outline.

36.   Rapid Brush Work

PLACE	COMPOSITION OF PLASTER	NUMBER OF LAYERS
PRE-ROMAN PERIOD		
Ancient Egyptian and Minoan plasters	lime with fibrous binders	
Place unspecified. A Greek plaster	base plaster of lime with sand or with fibrous binder or pounded brick or tile fragments; second renderings of lime and river sand; surface renderings of lime and marble dust	more than five, but specific number not given
Crete. Minoan paintings in Herakleon Museum		
Minoan plasters	pure lime	one
Assyria, Palace of Sargon at Khorsabad	lime whitewash	one
Etruria, Chiusi	painting direct onto wall, no plaster (p. 419)	none
Etruria. Plaster at Corneto	lime and sand (p. 419)	one
Etruria, Tomba del lètto funebre	half lime and half sand (p. 96)	one, with surface coat of lime whitewash
ROMAN PERIOD, First to Fourth centuries A.D.		
Domus Aurea	Vitruvian system (*see* text, p. 64)	
Casa dei Vetii	,, ,,	
Casa della Farnesina	,, ,,	
Casa della Farnesina. Later repairs		
Romano-Campanian paintings		
Boscotrecase	some of the original backing has gone; lime and sand plaster; surface plaster of lime and marble dust	more than two
Pompeian wall plasters		several
Pompei. Less important rooms	lime and sand (p. 422)	one
Pompei	base layers with sand; surface layers with marble dust	
Pompei, Villa dei misteri		
Other Pompeian villas		
Dura		one
A Roman villa		
Villa at Saint Médard	two layers of lime and sand; thin surface layer of stucco	three
Catacombs		one
Catacombs		

TABLE I

PLASTER	NUMBER OF LAYERS	THICKNESS	AREA OF PLASTER	
nd or with ⟩rick or tile nd river sand; nd marble dust	more than five, but specific number not given			
	one	½ to 2 cms		
	one			
o plaster	none			
	one	I cm		
⟩6)	one, with surface coat of lime whitewash			
p. 64)		up to 12 cms		
		,, ,, ,, ,,		
		,, ,, ,, ,,		
		½ to 3 cms		
ʒ has gone; marble dust	more than two			mono polish
	several	7–8 cms (p. 419)		
	one	½ to 3 cms		
⅃ust				mono polish
			vertical joins for monochrome backgrounds; joins following outlines of figures (p. 3–6)	
			vertical and horizontal joins	
	one		whole wall	
			regular shaped patches, the size of one scene	
;	three			
	one			
				somet polish

TABLE I

...A OF PLASTER	POLISHING	PAINTING ON FRESH OR DRY PLASTER	
			some ha...
			some ha...
			some ha...
			some ele...
		fresh plaster	yes (pp.
	monochrome backgrounds polished with color		some ele...
	monochrome backgrounds polished with color	fresh plaster	
...or monochrome backgrounds; outlines of figures (p. 3–6)		figures on wet plaster	
...rizontal joins		dry plaster	some ele...
		dry plaster	some ele...
...patches, the size of one scene		fresh plaster	
			some ele...
	sometimes a primitive polishing	sometimes begun on the fresh plaster, sometimes on the dry (pp. 327–333)	

...ING ON FRESH ...DRY PLASTER	INCISED OUTLINES OF PAINTING	SOURCE
		Alexander Eibner
		Rutherford J. Gettens and George L. Stout
	some have decorative borders only; some have outlines of composition only; some have outlines of figures	personal observation
		Prentice Duell and Rutherford J. Gettens
		ibid.
		Mary H. Swindler
		ibid.
	some elements of the composition (p. 93)	P. Duell and R. Gettens
		Ezio Aletti
		ibid.
		ibid.
		ibid.
	yes (pp. 273–274)	A. Eibner
	some elements of the composition	George Papadopulos
		M. Swindler
		M. Swindler
		Walter Klinkert
plaster		Leonetto Tintori and Millard Meiss, *Painting of the Life of St. Francis*
	some elements of the composition	*idem,* "Additional Observations"
	some elements of the composition	Carl H. Kraeling
		Arthur P. Laurie
		Henry Cros and Charles Henry
	some elements of the composition	M. Swindler
...un on the fresh plaster, ...the dry (pp. 327–333)		A. Eibner

PLACE	COMPOSITION OF PLASTER	NUMBER OF LAYERS
BYZANTINE AND MEDIAEVAL		
Byzantine Turkey		
Cappadocian churches. Non figural painting	none	
Cappadocia, Yilanlı Kilise. Figural painting	none	
Cappadocia, Saklı Kilise. Eleventh to twelfth century?	lime whitewash?	
Cappadocia, Çavuş In. Tenth to eleventh century?	lime whitewash	
Cappadocia, Direkli Kilise. Tenth century	lime and straw or chaff	one
Cappadocia, Samanlı Kilise	lime and straw or chaff	
Cappadocian churches	lime and sand base; lime and marble dust surface (p. 311)	two
Eski Gümüş. Eleventh to twelfth centuries?	lime and straw or chaff	one
Eski Andaval. Eleventh to twelfth century?		one
Pontus, Byzantine churches. Tenth to fifteenth centuries	usually lime and straw or chaff	one or two
Aynalı Mağara. Figural painting, twelfth century?	lime whitewash?	
Aynalı Mağara. Non figural painting	none	
Trebizond, St. Sophia. Thirteenth century	lime and straw or chaff. In vaults and dome, a rough foundation plaster layer of lime and sand	sometimes one; sometimes two
Myra, St. Nicholas. Twelfth century?	lime with straw or chaff	one in s. aisle, two in church
Alanya citadel church. Twelfth century?		one
Istanbul, Kariye Djami, Parecclesion. Fourteenth century	lime and straw	two
Kariye tomb. Fifteenth-century painting	base of lime and crushed brick or pottery; surface layer of lime	two
Dörtkilise, Georgian church. Tenth to twelfth century	lime only?	one
Haho, Georgian church. Tenth to twelfth century	lime only?	one
İşhan, Georgian church. Tenth to twelfth century	lime only?	one
Öşk Vank, Georgian church. Tenth to twelfth centuries	lime only?	one
Cappadocian churches		
Cappadocian churches		
Most Cappadocian churches		one
St. Euphemia. Fourteenth century?		

TABLE II

PLASTER	NUMBER OF LAYERS	THICKNESS	AREA OF PLASTER	
	one	½ to 3 cms		none
	two			,,
ce (p. 311)				
	one	I or 2 cms		
	one	I or 2 cms		
haff	one or two	I or 2 cms	vertical or horizontal joins along the borders of scenes	
vaults and dome, layer of lime	sometimes one; sometimes two	2–3 cms	sometimes whole scenes; sometimes sections of scenes; smallest area of plaster is size of one head	some
	one in s. aisle, two in church	½ to 3 cms		
	one	½ to 3 cms		
	two	2 to 3 cms	vertical or horizontal joins along the borders of scenes; large scenes split into sections	?
ick or pottery;	two			
	one	I to 2 cms		plaste
	one			,,
	one			,,
	one			,,
	one	½ to 2 cms	vertical or horizontal joins along the borders of scenes	
		½ to 3 cms	vertical or horizontal joins along the borders of scenes	

TABLE II

:A OF PLASTER	POLISHING	PAINTING ON FRESH OR DRY PLASTER	
	none		none
	,,		,,
		begun on fresh plaster	none
		begun on fresh plaster	none
izontal joins along the ies		begun on fresh plaster	sometim
le scenes; ions of scenes; f plaster is size of one head	some areas	begun on fresh plaster	sometim dryish p
			impressi plaster
		begun on fresh plaster	
zontal joins along the borders scenes split into sections	?	begun on fresh plaster, continued on dry plaster	some ele wet plas
	plaster only?	dry?	
	,, ,,	begun on fresh plaster	
	,, ,,	begun on fresh plaster	
	,, ,,	begun on fresh plaster	
		dry plaster	
		fresh plaster	
zontal joins along the es		begun on fresh plaster	
zontal joins along the es			

ING ON FRESH)RY PLASTER	INCISED OUTLINES OF PAINTING	SOURCE
		personal observation
		,, ,,
		,, ,,
		,, ,,
	none	,, ,,
	,,	,, ,,
		A. Vinner
plaster	none	personal observation
plaster	none	,, ,,
plaster	sometimes elements of composition	,, ,,
		,, ,,
		,, ,,
plaster	sometimes elements of composition in dryish plaster	,, ,,
	impressing of lines of figures into damp plaster	,, ,,
plaster		,, ,,
plaster, continued on	some elements of composition in wet plaster	Paul A. Underwood
		ibid.
		personal observation
plaster		,, ,,
plaster		,, ,,
plaster		,, ,,
		Guillaume de Jerphanion
		Hans Rott
plaster		personal observation
		Rudolf Naumann and Hans Belting

III

PLACE	COMPOSITION OF PLASTER	NUMBER OF LAYERS
YUGOSLAVIA		
All Macedonian churches	lime plaster (p. 12)	one
Vodoča. Twelfth century	base layer of lime and sand; surface layer of lime and hemp	two
Staro Nagoričino. Early fourteenth century		sometimes two
Ohrid, St. Clement. Late thirteenth century		
Matejč. Fourteenth century	lime and straw or chaff	
Mlado Nagoričino, St. Petka. Sixteenth century		
Matka, St. Andrew. Mid-fourteenth century		
Paintings formerly in the Kuršumlu Han Museum. Fifteenth to seventeenth centuries		
Nova Pavlica. Fourteenth century		
Sopoćani. Thirteenth century		
Ravanica. Fourteenth to fifteenth centuries		
Peč, St. Demetrius. Thirteenth century		
Prizren, Bog. Ljeviša. Twelfth to fourteenth centuries		
Žiča. Thirteenth to fourteenth centuries		
Studenica, south chapel of exonarthex. Thirteenth century		
Studenica. Saints Joachim and Anna. Early fourteenth century		
Gračanica. Early fourteenth century		
All important painted churches of twelfth to fifteenth centuries in Serbia and Macedonia		one or two
GREECE		
Salonica, Holy Apostles. Early fourteenth century?		
Prophet Elias. Salonica. Early fourteenth century?		
Salonica, Saint Demetrius, chapel at south end. Fourteenth century		

TABLE III

PLASTER	NUMBER OF LAYERS	THICKNESS	AREA OF PLASTER	
	one	2 mm to 12 cms	vertical or horizontal joins along the borders of scenes	
; surface layer	two	1 to 4 cms		
	sometimes two			
			vertical or horizontal joins along the borders of scenes; large scenes split into sections	
			vertical or horizontal joins along the borders of scenes; small patches for repainting heads	
			vertical or horizontal joins along the borders of scenes; large scenes split into several sections	
	one or two	a few cms	vertical or horizontal joins along the borders of scenes	none

TABLE III

;A OF PLASTER	POLISHING	PAINTING ON FRESH OR DRY PLASTER	
izontal joins along the ıes		begun on fresh plaster	always ı (p. 20)
			yes
izontal joins along the borders ə scenes split into sections			freehanc
			freehanc
		begun on fresh plaster	quite de the fresl
			some elɛ
izontal joins along the borders ll patches for repainting heads			
izontal joins along the borders ə scenes split into several			most of
			main ou
			main ou
			none in fourteen
			in early outlines fourteen
			main ou
			main ou
			main ou
izontal joins along the ıes	none noticed	probably begun on the fresh plaster	sometin
			none
			none
			main ou

ING ON FRESH DRY PLASTER	INCISED OUTLINES OF PAINTING	SOURCE
ι plaster	always main outlines of composition (p. 20)	Zdravko Blažić
	yes	*ibid.*
		personal observation
	freehand incision	Z. Blažić
	freehand main outlines of composition	personal observation
		,, ,,
ι plaster	quite detailed outlines of composition in the fresh plaster	,, ,,
	some elements of compositions	,, ,,
		,, ,,
	most of the paintings	,, ,,
	main outlines of compositions	,, ,,
	main outlines of compositions	,, ,,
	none in twelfth century; present in fourteenth century	,, ,,
	in early thirteenth century all have main outlines of composition; none in fourteenth	,, ,,
	main outlines of compositions	,, ,,
	main outlines of compositions	,, ,,
	main outlines of compositions	,, ,,
ιn on the fresh plaster	sometimes	,, ,,
	none	personal observation
	none	,, ,,
	main outlines of compositions	,, ,,

PLACE	COMPOSITION OF PLASTER	NUMBER OF LAYERS
CYPRUS		
Asinou. Twelfth to fourteenth centuries	lime and straw or chaff	one in twelfth and fourteenth centuries; surface of lime for thirteenth century
Agios Chrysostomos. Early twelfth century	lime and straw or chaff	
Kakopetria, St. Nicholas. Eleventh to fifteenth centuries		
Trikomo. Early twelfth century	lime and straw or chaff	
Agios Neophytos. Twelfth century	lime and straw or chaff	one
Lagoudera. Late twelfth century	lime and straw or chaff	one
Antiphonitis. Late twelfth century?	lime and straw or chaff	
Perachorio. Twelfth century	lime and straw or chaff	
Moutoullas. A.D. 1280	lime and straw or chaff	
Rizokarpasso, Agia Mavra. Twelfth century	lime and straw or chaff	
RUSSIA		
Novgorod, St. Sophia	base layer of lime and powdered brick and pottery; surface layer of lime whitewash	one
Novgorod, St. Sophia. Fourteenth century	a terra-cotta colored plaster	one
St. Nicholas on the River Lipna. A.D. 1292–1288	lime and sand plaster (p. 255)	
Russian churches. Eleventh to twelfth centuries	layers of lime and powdered brick and pottery fragments	usually two
Armenia, Aktala. Eleventh century	lime and straw	one
Kiev, St. Michael. Twelfth century	lime and straw	one
Unspecified churches. Twelfth to fifteenth centuries	plasters made up of lime, sand, powdered brick, powdered white stone, traces of coal, flax binder	one
Seven Novgorod churches of fourteenth century and Svetogorski Monastery	plaster as described by Cennini	two
Unspecified churches. Fifteenth to seventeenth centuries	lime	one

TABLE IV

PLASTER	NUMBER OF LAYERS	THICKNESS	AREA OF PLASTER	
	one in twelfth and fourteenth centuries; surface of lime for thirteenth century	a few cms	vertical and horizontal joins along the borders of scenes	none in the some
		a few cms	vertical and horizontal joins along the borders of scenes	
		a few cms	vertical and horizontal joins along the borders of scenes	
		a few cms	vertical and horizontal joins along the borders of scenes	
	one	a few cms	vertical and horizontal joins along the borders of scenes; also small irregular patches of plaster for repainting	
	one	a few cms	vertical and horizontal joins along the borders of scenes. Also small patches.	polish face c
		a few cms	vertical and horizontal joins along the borders of scenes	
		a few cms	vertical and horizontal joins along the borders of scenes	
		a few cms	vertical and horizontal joins along the borders of scenes	
		a few cms	vertical and horizontal joins along the borders of scenes	
lered brick and 1e whitewash	one			
:	one			
i5)		7 to 8 mms		
l brick and	usually two	2 or 3 cms	vertical or horizontal joins along the borders of scenes	
	one			
	one			
ind, powdered e, traces of coal,	one			
nini	two			
	one			

TABLE IV

A OF PLASTER	POLISHING	PAINTING ON FRESH OR DRY PLASTER	
rizontal joins along the es	none except on S. George in the narthex; possibly some in conch of Apse	begun on the fresh plaster	some ou thirteen
rizontal joins along the es		begun on the fresh plaster	
rizontal joins along the es		begun on the fresh plaster	
rizontal joins along the es		begun on the fresh plaster	
rizontal joins along the es; also small irregular ter for repainting		begun on the fresh plaster sometimes on dry plaster	
rizontal joins along the es. Also small patches.	polishing for areas of face or flesh	begun on the fresh plaster	very few in plaste
rizontal joins along the es		begun on the fresh plaster	
rizontal joins along the es		begun on the fresh plaster	
rizontal joins along the es rizontal joins along the es			
zontal joins along the es		fresh plaster	very sel
			yes

ING ON FRESH ΟRY PLASTER	INCISED OUTLINES OF PAINTING	SOURCE
resh plaster	some outlines of composition in the thirteenth and fourteenth centuries	personal observation
resh plaster		,, ,,
resh plaster		,, ,,
resh plaster		,, ,,
resh plaster dry plaster		personal observation; Cyril Mango and Ernest J. W. Hawkins
resh plaster	very few, but important shapes were marked in plaster with trowel (see text, pp. 98–99)	personal observation
resh plaster		,, ,,
resh plaster		Arthur H. S. Megaw and Ernest J. W. Hawkins
		personal observation
		,, ,,
		Iu. N. Dmitriev
		E. A. Dombrovskaya
		A. Vinner
	very seldom (p. 264)	Iu. N. Dmitriev
		E. A. Dombrovskaya
		idem
		idem
		idem
	yes	idem

V

PLACE	COMPOSITION OF PLASTER	NUMBER OF LAYERS
Spasov Neredica		
Russian churches. Twelfth century	lime with flax, hemp or straw	
ITALY S. Maria Antiqua. Eighth century	lime with straw and tow (p. 344)	one
Castelseprio. Eighth century?		two
Aquileia, crypt. Twelfth century?		
Concordia Sagittaria. Eleventh to twelfth centuries?	lime with blackish sand	one
Verona, San Zeno		
Assisi, Upper Chapel. Cimabue, thirteenth century		one (p. 14)
Assisi. Paintings of the Life of St. Francis. Thirteenth century		
S. Angelo in Formis. Twelfth century		
Rome, S. Francesco Romana. Thirteenth century		
Pistoia, S. Bartolomeo. Late thirteenth century		
S. Cecilia. Cavallini, thirteenth century		
S. Maria in Vescovio		
Pisa, Campo Santo	reed backing for plaster as recommended by Vitruvius	
Padua, Arena Chapel. Late thirteenth century		
Padua, Arena Chapel		three (p. 14)
Padua, Arena Chapel		
Peruzzi Chapel	upper layer of lime and sand (p. 78, note 6)	two (p. 15)
Bardi Chapel		
Arezzo. Piero della Francesca		
Cappella Brancaci al Carmine. Masaccio		
Castagno, S. Apollonia. Andrea del Sarto		

TABLE V

PLASTER	NUMBER OF LAYERS	THICKNESS	AREA OF PLASTER	
			regular shaped patch the size of one scene; one scene with area of 9 sq. ms	
ιw				
· 344)	one	2 to 3 cms		
	two		the whole wall	
		½ to 3 cms		
	one	½ to 3 cms		
				the sι colun
	one (p. 14)			
			small irregular patches make up a single scene; vertical or horizontal joins along the borders of scenes	
			large scenes divided into patches (p. 278)	
			first examples of a single scene being broken into small patches	
			single scenes broken into small patches	
			vertical or horizontal joins along the borders of scenes (p. 278)	
recommended				
			single scenes broken into small patches	mono polisl paint
	three (p. 14)			
				mono polisl
ιd (p. 78, note 6)	two (p. 15)		joins correspond with scaffold holes (p. 15)	
			small irregular patches make up a single scene	
			small irregular patches make up a single scene (pls. 4–6)	
			small irregular patches make up a single scene (pl. 9)	

TABLE V

..A OF PLASTER	POLISHING	PAINTING ON FRESH OR DRY PLASTER	
patch the size of one scene; area of 9 sq. ms			
		begun on the fresh plaster	none
		completed on the fresh plaster?	
	the surface of a painted column		
patches make up a single or horizontal joins along the ι.es		fresh plaster	
vided into patches (p. 278)			
of a single scene being broken :hes			
			main ou
roken into small patches			
izontal joins along the ι.es (p. 278)			
roken into small patches	monochromatic surfaces polished with color, e.g., painted marble	begun on the fresh plaster; some finishing on the dry plaster	
	monochromatic surfaces polished with color		
ιd with scaffold holes (p. 15)		dry plaster (pp. 15, 62)	
patches make up a single			
patches make up a single)			
patches make up a single			
			some fre

ING ON FRESH ⏘RY PLASTER	INCISED OUTLINES OF PAINTING	SOURCE
		Iu. N. Dmitriev
		A. Vinner
		A. Eibner
⸍resh plaster	none	Alberto de Capitani D'Arzago
		personal observation
the fresh plaster?		,, ,,
		Ernst Berger
		Eve Borsook
		L. Tintori and M. Meiss; *Painting of the Life of St. Francis*
		Robert Oertel
		idem
	main outlines of a figure	Ugo Procacci
		R. Oertel
		idem
		L. Tintori and M. Meiss, *Painting of the Life of St. Francis*
⸍resh plaster; on the dry plaster		*ibid.*
		E. Borsook
		A. Eibner
p. 15, 62)		Leonetto Tintori and Eve Borsook
		L. Tintori and M. Meiss *Painting of the Life of St. Francis*
		idem, "Additional Observations"
		U. Procacci
	some freehand incision (pp. 26, 33–34)	E. Borsook

PLACE	COMPOSITION OF PLASTER	NUMBER OF LAYERS
S. Maria Novella. Nardo di Cione		
Assisi, St. Francis. Paintings of the Life of Christ. Thirteenth to fourteenth century		
S. Angelo in Formis		
Assisi. Lamentation by Giotto. Thirteenth century?		
SPAIN		
Boada	lower layer of lime and sand (p. 70)	
Montmell	lower layer of lime and sand (p. 70)	
San Miguel de la Seo de Urgel		
Romanesque, general	lower layer of lime and sand (p. 70)	usually two
FRANCE Berzé-la-Ville	base: limewash and yellow ochre 2nd: one part lime, three parts sand 3rd: limewash 4th: limewash with azurite blue surface: lime and sand and some fat content (pp. 66–67)	five
Berzé-la-Ville, crypt	base of lime and sand; surface of lime whitewash (pp. 26–27)	two
Tournus	base of one part lime and three parts sand; surface of lime whitewash (p. 94)	two
Cluny, Church of St. Hugh, Chapel of St. Gabriel	base of one part lime and three parts sand; surface of lime whitewash (p. 83)	two
Auxerre	lime and sand	two
St. Savin		
Cluny, Abbey Church		
St. Mayeul		
GERMANY Burgfelden Haut		
Rhenish churches	lime and sand (pp. 646–647)	
SWITZERLAND Zurich, Painting in Landesmuseum		
ENGLAND Kempley		one
Chichester		

TABLE VI

PLASTER	NUMBER OF LAYERS	THICKNESS	AREA OF PLASTER	
			regular surface joins corresponding more or less with scenes	
			small irregular patches make up a single scene	
1 (p. 70)				
1 (p. 70)				
1 (p. 70)	usually two			
ochre arts sand : blue some fat content	five			yes
ace of lime	two	o to 1 cm		
hree parts sand; p. 94)	two			
hree parts sand; p. 83)	two			
	two			
		½ to 3 cms		
				yes
)				
	one	½ to 3 cms	horizontal joins making three patches for chancel vault	
			regular shaped patch the size of one scene	

TABLE VI

A OF PLASTER	POLISHING	PAINTING ON FRESH OR DRY PLASTER	
			possibly paper m
joins corresponding more or s			
		begun on the wet plaster	
patches make up a single			
		completed on the fresh plaster (p. 71)	
		begun on the fresh plaster (p. 71)	
	yes	dry plaster (pp. 69, 89, 97)	none (p.
		fresh plaster	
		dry plaster	
		fresh plaster	
		dry plaster	
		dry plaster	
		fresh plaster (p. 81)	
	yes		
		begun on the fresh plaster	
			main ou
s making three patches for			
patch the size of one scene			

ING ON FRESH)RY PLASTER	INCISED OUTLINES OF PAINTING	SOURCE
	possibly incision made around a cut-out paper model (p. 21)	E. Borsook
		L. Tintori and M. Meiss, *Painting of the Life of St. Francis*
vet plaster		Janine Wettstein
		L. Tintori and M. Meiss, *Painting of the Life of St. Francis*
		Charles L. Kuhn
		idem
the fresh plaster (p. 71)		*idem*
resh plaster (p. 71)		*idem*
). 69, 89, 97)	none (p. 81)	Fernand Mercier
		idem
		idem
		idem
		Paul Henri Michel
		idem
		F. Mercier
). 81)		*idem*
		A. Eibner
resh plaster		Paul Clemen
	main outlines of composition	personal observation
		personal observation
		Arthur P. Laurie